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FOREWORD

This reference work originated in response to an evident demand for something *new* in the encyclopedic field. The larger and more exhaustive treatises were too specialized and technical for the every-day reader, besides being too costly, while the smaller ones were either reprints, abridgements, or condensations of some older or more extended work. It was felt that there was room for a modern presentation of the information and facts so necessary for access in every home, school, and library, and in a style and form that would lead to appreciation and frequent consultation. How well this object has been attained has been shown in part by the reception accorded the first edition of the work and is a question open for the public still further to decide.

The preliminary edition, under the title *Aiton's Encyclopedia,* met with such hearty and widespread commendation that an extension of its scope seemed warranted. All the various departments have been revised and new articles added so as to make a well-balanced and consistent whole. Countries and other subjects requiring treatment as a result of the World War have received special attention. The state and city articles have been reviewed and revised by actual residents who are especially qualified to present these subjects satisfactorily by giving them accurate and appropriate treatment. The latest information has been secured wherever possible, and all statistical matter has been compiled from the most recent available reports.

While not assuming to cover the whole realm of human knowledge, THE STANDARD REFERENCE WORK aims to be sufficiently comprehensive to meet the demands of all except those making an exhaustive research. The general reader does not wish to spend a half hour plodding through pages of irrelevant matter in search of the salient points that his questions demand. For such a reader as this and for all desiring the most vital and interesting points on a subject, this work is especially adapted. A definite plan has been followed in the distribution of material so that no department should be overlooked, and so that under each department should be included all topics of real value to the average reader. This has required a keen discrimination founded upon an extended experience in the various phases of educational effort, a qualification possessed in a remarkable degree by the editorial staff.

As much of the reference work in the home as well as the school is incidental to the subject matter in courses of study, all topics of reference likely to be demanded in such courses are included. Geography naturally comes in for a large share of attention. In addition to countries, states, and leading cities, articles on explorers, plants, animals, and the various productions are included to supplement the text-book and furnish a sympathetic treatment of the fundamental facts there presented. A geography or atlas being so generally at hand, the policy of this work has been to

utilize the space demanded by extensive maps for additional material less easily accessible. A text-book of American history likewise being commonly available, much of detail in that field has given way to topics of general, current, and governmental interest, along such lines as taxation, arbitration, municipal problems, labor and capital, and economics, not so readily found elsewhere. The field of biography has been most carefully scanned and those names worthy of but perfunctory notice have been omitted altogether, thus making room for the adequate treatment of the names really significant, and the purpose has been in such articles to show why they are significant in the world's history.

The field of literature has furnished the basis for many topics aside from authors themselves. Noted books, poetic masterpieces, and the characters of familiar allusion in fiction and drama are here discussed for the student. Literary biography, especially emphasizing the conditions leading to authorship, is usually accompanied by a few brief quotations, as well as a critical estimate of the writer's work, which makes this not merely a work of reference, a means to an end in the perusal and enjoyment of some other literary production, but a source of pleasure and profit *per se*. A sufficient number of articles on living writers gives a reasonable guide to current literary effort.

In this work an attempt has been made to include articles on most scientific, industrial, and vocational topics. The growing interest in agriculture, and the hope that this work may find its way largely into rural homes, have led to considerable space being given to this subject in its most practical aspects. The same is true of household economics.

The distinguishing characteristic of the work, however, is its style, for which the readers are indebted to the original author, whose policy of abandoning the dry, terse presentation of bare facts, often characteristic of such a work, for a sympathetic treatment with literary merits of its own, has been followed to a greater or less extent by other writers and contributors. The work is unique in that it is actually interesting to read. Much of it has a distinct claim to recognition in the field of literary effort. The language is simple enough for any child who may consult it, and at the same time scholarly enough for an adult. The authors have made a special point of appealing to the interest so as to induce young people as well as adults to acquire the habit of consulting the work.

When the more exhaustive works of reference which have undergone numerous revisions are still marred by occasional errors in typography and subject matter, it is not to be hoped that this work will prove an absolute exception. Readers who may detect errors will extend a courtesy to the editors by reporting such cases and thus coöperating with them in their efforts to secure absolute fidelity to truth.

H. M. S.

PUBLISHERS' NOTICE

In presenting THE STANDARD REFERENCE WORK to the public, it is confidently believed by the publishers that they are offering to the general reader a set of books of peculiar merit and of great practical value, at a price within the reach of every school and family. The authors, in plan, in selection of topics, and in scope and method of treatment, have been bound by no worn-out precedents in preparing a work to meet the demands of the present day. They have courageously omitted many threadbare topics usually found in works of reference which have nothing to justify their appearance in a work of this sort for the people. Such useless lumber as descriptions of hundreds of ordinary prosperous towns and biographies of numerous men of mere local note, facts which those in the immediate locality know and others care nothing about, has been discarded. This makes room for topics of greater consequence, each of which has been included for the distinct addition it makes to the work.

Realizing the value of the body-matter in this reference set, the publishers have taken pride in bringing it out in keeping mechanically. The paper used is of superior quality and was selected with special reference to securing a surface best suited for the type and cuts, and at the same time avoiding that gloss so injurious to the eyes. Such a large, handsome type, we confidently assert, has never before been used in a reference work. The abundant illustrations in both character and quality are unexcelled. The modern method of full-page illustrations, rather than many inferior cuts distributed through the text, in the main, has been followed. The many half-tone plates in both black and duotone, as well as the numerous color plates, have been made at great expense especially for this work. In anticipation of the frequent and hard use we trust THE STANDARD REFERENCE WORK will receive, the best material has been used in the binding and the most approved methods employed in securing the pages and cover.

Though alphabetically arranged and with an extensive system of cross references in the text, in order to still further enlarge the usefulness of the work, a most valuable SYNTHETICAL INDEX has been appended. All the topics which lend themselves readily to classification have been arranged systematically under general headings with appropriate subdivisions. Thus is made available by consulting this index all the matter in the work relating to the subject desired. As a further aid in the use of the work a new department known as THE STANDARD EDUCATOR has been added, containing outlines, plans, type studies, and suggestions for a systematic and methodical course in the fundamentals of a general education. That the worth of the work may prove to be somewhat commensurate with the ideals and efforts in its preparation is the wish of

THE PUBLISHERS.

A

Aachen, or **Aix-la-Chapelle,** ä′ken, or āks-lä-shä-pĕl′, a town of Prussia, an hour's ride by rail to the westward of Cologne. Aachen is the German, Aix-la-Chapelle the French name. Both Aachen and Aix mean the waters, or fountains. The latter name is best known in history; the former is the present official or post-office name. Aachen is an ancient city. In the days of the Roman Empire it was a military camp in the vicinity of mineral springs, even then held in repute. It was a favorite residence of Charlemagne, who died and was buried here in 814. It was the northern capital of the medieval German Empire. Many emperors were crowned here. Diets were held and treaties of peace were concluded at Aix-la-Chapelle.

Of the old buildings only a few remain, notably a cathedral erected in part by Charlemagne. The central part of this cathedral is eight-sided. The dome is supported by massive marble pillars brought from an old palace in Ravenna. In the central aisle hangs a fine bronze chandelier, presented by Frederick Barbarossa in 1165. Bronze doors cast in 804, pillars, arches, a high pulpit, stained glass, a copper reading desk, the tomb of Otho III, the sarcophagus or stone coffin of Charlemagne, his hunting horn, and many other interesting objects may be seen. The regalia of the German emperors were kept here until 1795, when they were transferred to Vienna.

A modern city of 144,000 people, with attractive streets, shops, large hotels and buildings, has grown up. The springs are impregnated with sulphur. They are still patronized by a fashionable concourse of 8,000 patients a year, who come to drink the water and to bathe in it for their health. The walls of the ancient city have been razed to make room for modern promenades. See CHARLEMAGNE; VIENNA.

Aaron, the elder brother of Moses and the first high priest of the Israelites. He was his brother's spokesman before Pharaoh and a leader in the Exodus. The worship of the golden calf was permitted by him, for which he was not allowed to enter the promised land. See MOSES.

Abacus, ăb′a-kŭs, a word of Greek origin used in ancient times to designate a flat tray or board sprinkled with sand and used for drawing or making calculations. Its present meanings, seeming at first glance to vary widely, are all derived naturally enough from that first meaning, in which use the word is now obsolete. In architecture the term abacus is applied to the upper part of the capital of a column, which was formerly a square, flat stone. It differs in varying forms of architecture, being either square or circular; also either plain, grooved, or sculptured. The word abacus designates commonly a calculating table or frame consisting of beads running in grooves or on rods. It is used in kindergartens and primary grades in teaching the elements of numbers, and is called frequently a counting frame. In China and other countries of the Far East it is still used for making calculations. A tray or table with compartments for holding bottles or cups bears also the name abacus.

Abattoir. See PACKING HOUSE.

Abbey, Edwin A. (1852-1911), a celebrated American artist. He was born in Philadelphia, but in 1878 removed to London where he continued to reside. He ranks among the foremost artists of the day, some of his most noted works being the

panels entitled *The Quest of the Holy Grail,* in the Boston public library, and a coronation picture of Edward VII. At the time of his death he was preparing a series of panels for the capitol at Harrisburg, Pennsylvania, only about half of which were finished. Besides being an artist, he was noted as a writer, having published a number of books on art. He was a member of most of the leading art societies both in America and Europe.

Abbot, The, a novel by Sir Walter Scott. This story is a sequel to *The Monastery.* It relates to the history of Mary, Queen of Scots. The author says of it, "I ventured to awaken, in a work of fiction, the memory of Queen Mary, so interesting by her wit, her beauty, her misfortunes, and the mystery which still does, and probably always will, overhang her history." See SCOTT.

Abbotsford, the famous residence of Walter Scott. In 1811 Scott paid $20,000 for a farm of a hundred acres on the south bank of the Tweed. Of this property Lockhart writes, "The farm consisted of a rich meadow or haugh along the banks of the river, and about a hundred acres of ground behind, all in a neglected state, undrained, wretchedly enclosed, much of it covered with nothing better than the native heath. The farm-house itself was small and poor, with a common kail-yard on one flank, and a staring barn on the other; while in front appeared a filthy pond, covered with ducks and duckweed, from which the whole tenement had derived the unharmonious designation of Clarty Hole."

Scott's choice of the place, however, was determined by a beautiful view of the Tweed and of ruined Melrose Abbey, three miles away. He changed the name to that of a nearby ford, formerly used by the abbots of that famous abbey. Adjoining land was bought later. Scott laid out the grounds with taste. He planted about fifty acres with young trees, and had the satisfaction of living long enough to cut good sized trees planted by his own hand. What Scott declared at first should be a cottage developed into an irregular rectangular building of proportions befitting a castle, and, like a castle, provided with turrets at every available angle. A fine entrance was adorned with trophies of the chase and ancient armor after the fashion of the Middle Ages. The property still belongs to Scott's descendants on a daughter's side of the family. Scott's library, rich in ballads and in books on witchcraft, is kept as he left it. Abbotsford is visited by several thousand people each year. No student should fail to read Washington Irving's *Visit to Abbotsford.*

See SCOTT; MELROSE.

Abbott, Jacob (1803-1879), an American writer. He was born at Hallowell, Maine. He was a graduate of Bowdoin College, a student of divinity at Andover, a professor of mathematics in Amherst College, the principal of a girls' school in Boston, and pastor of a Congregational church at Roxbury, Mass. He had a fondness for young people, and wrote several series of instructive story books. The best known of these are the Rollo Books in which he describes Rollo's experiences while traveling in the United States and in various foreign countries. Mr. Abbott was for years one of the main contributors to *Harper's Monthly.* In his later years he retired to Farmington, Maine, where he died October 31, 1879.

Abbott, John S. C. (1805-1877), an historical writer. A brother of Jacob Abbott. He also took a college course at Bowdoin, a theological course at Andover, and became a Congregational pastor. He had several charges, including the church at New Haven, where he died. He wrote a number of histories for young people, including a history of Frederick the Great, Cyrus, etc. Abraham Lincoln, whose chances for schooling were slight, read these histories with delight, and said that he owed to John S. C. Abbott all the knowledge of general history he ever acquired. Mr. Abbott wrote also a *History of the Civil War in America.* Other works of an ethical nature are *The Mother at Home, The Child at Home,* etc.

Abbott, Lyman (1835 - 1922), a distinguished clergyman and editor, was born in Roxbury, Massachusetts. In his youth he studied law and was admitted to the

bar, and afterwards practiced in partnership with his two brothers. He gave up the law for theology and studied for the ministry of the Congregational Church with his uncle, S. C. Abbott, and was ordained at Farmington, Me., in 1860. His first charge was in Terre Haute, Ind., where he remained for five years. As editor of the *Christian Union*, which was later to be known as *The Outlook,* he worked with Henry Ward Beecher, and here his broad interpretations of the Bible and religion resulted in the solution and spiritualization of many difficult social and civic problems of the day. After the death of Mr. Beecher, Dr. Abbott became pastor of Plymouth Church, Brooklyn, where he was installed January 16, 1889. He remained here until 1899, when he resigned. He was editor-in-chief of *The Outlook* and was connected with it for nearly 40 years.

Dr. Abbott was one of the most active leaders in civic and religious movements in the United States. As editor, clergyman, author and theologian he exhibited a character that impressed all by its serenity and poise. In his work as editor of *The Outlook* he came in contact with many famous men, and his loveliness of character made him many warm friends. Before entering the pulpit Dr. Abbott, in collaboration with his brother, wrote two novels: *Conecut Corners,* and *Matthew Caraby.* Among his important works are: *The Result of Emancipation in the United States; Old Testament Shadows of New Testament Truths; A Layman's Story; Dictionary of Religious Knowledge; A Study in Human Nature; The Theology of an Evolutionist; The Evolution of Christianity; Social Problems;* and *The Problems of Life.* The following words of his are well known: "He who denies the brotherhood of man is as much an infidel as he who denies the fatherhood of God." He died October 22, 1922.

Abbreviations.—The following list includes the abbreviations in common use. Abbreviations used by newspapers are usually of temporary significance, and are omitted.

A	Acre; America.
A.B. or B.A.	*Artium Baccalaureus,* Bachelor of Arts.
A. D.	*Anno Domini.* In the year of our Lord.
adj., or Adj.	Adjective.
ad. lib.	*Ad libitum* (L., at pleasure).
adv.	*Advalorem;* Adverb; Adverbially; *Adversus* (L., against); Advertisement; Advocate.
æ., æt., ætat.	*Ætatis* (L., of age).
A. E. F.	American Expeditionary Forces.
A. F. A. M.,	or A. F. & A. M. Ancient Free and Accepted Masons.
Ag	*Argentum* (L., silver).
agr., or agric.	Agriculture; Agricultural.
agt.	Agent.
Al	Aluminum.
Ala.	Alabama.
Alas.	Alaska.
Alt.	Altitude.
Am.	America; American.
a. m.	*Ante meridiem* (L., before noon).
A. M.	*Anno Mundi* (L., in the year of the world); *Ave Maria* (L., Hail Mary).
Anon.	Anonymous.
Ans., or ans.	Answer.
A. O. U.	American Ornithologists' Union.
Apr.	April
Aq., or aq.	*Aqua* (L., water).
As	Arsenic.
Att. or Atty.	Attorney.
Au	*Aurum* (L., gold).
Aug.	August.
Av.	Average; avenue.
A. V.	Authorized Version.
avdp.	Avoirdupois.

B

b.	Born.
B. A.	British America; Bachelor of Arts.
Ba	Barium.
bal.	Balance.
Bart.	Baronet.
bbl.	(pl. bbls.) Barrel.
B. C.	Before Christ; British Columbia.
B. C.E.	Bachelor of Civil Engineering.
B. C. L.	Bachelor of Civil Law.
B. D.	Bachelor of Divinity.
Bdls.	Bundles.
Bds.	(Bound in) Boards.
Be	Beryllium.
B. I.	British India.
Bi	Bismuth.
Bor	Boron.
Bot.	Botanical; botanist; botany; bought.
Bp.	Bishop.
Bro.	Brother; (pl., bros.), Brother.
B. S.	*Baccalaureus scientiæ,* Bachelor of Science.
Bus., or bush.	Bushel.

C

C	Carbon.
c	Carton; cathode, cent; centime; centimeter; century; chapter; child; *circa* (L., about); *congius* (L., gallon); cost; cubic; current.

Ca. Calcium; calendar; calends; calorie.
Cal., Calif. California.
Can. Canada.
Caps., or caps. Capitals.
Capt. Captain.
Cash. Cashier.
Cath. Catholic; Catherine; Cathedral.
Cd Cadmium.
C. E. Civil Engineer.
Ce Cerium.
Cel. Celsius.
Celt. Celtic.
Cent. Centigrade; Centum; Central; Century.
Cf., or cf. Confer; compare.
cg. Centigram.
C. G. S. Centimeter; gram; second.
C. H. Courthouse; custom house.
Chanc. Chancellor.
Chap. Chapter.
Chem. Chemistry; chemical; chemist.
circ. *Circa; circiter, circum* (L., about).
Cl Chlorine.
cl Centiliter.
cm Centimeter.
cml. Commercial.
Co Cobalt.
Co. Company; county.
C. O.D. Cash (*or* collect) on Delivery.
Col. Colonel.
Col., or Colo. Colorado.
Com. Commissioner; Commodore; Committee; Commerce; Common; Commander.
Cong. Congress; Congregation; Congregational.
Conj., or conj. Conjunction.
Conn. Connecticut.
Cor. Corinthians.
Cor. Sec. Corresponding Secretary.
C. P.A. Certified Public Accountant.
Cr. Credit; creditor; chromium.
C. S. Christian Science; Civil Service.
C. S.A. Confederate States of America.
Ct. Connecticut; Count; court.
Cu *Cuprum* (L., copper).
cu., cub. Cubic.
cwt. Hundredweight.
cyc. or cyclo. Cyclopedia; cyclopedic.

D

D. David; didymium.
D., or d. Day; died; dime; daughter; deputy; degree.
Dan. Danish; Daniel.
D. C. District of Columbia.
D. D. *Divinitatis Doctor* (L., Doctor of Divinity).
Dec. December; declination; declension.
Del. Delaware; delegate.
Del., or del. *Delineavit,* (L., he *or* she, drew it).
Dem. Democrat; democratic.
Den. Denmark.
Dep. Deputy; department.
Dept. Department; deponent.
Deut. Deuteronomy.
Dft., or dft. Defendant.
D. G. *Dei gratia* (L., by the grace of God); *Deo gratias* (L., thanks to God); Director General.
D. H. Deadhead.
Dict. Dictionary
Dim., or dim. Diminutive; diminuendo.
Div. Dividend; division; divide; divided; divisor.
dl. Deciliter.
D. Lit. Doctor of Literature.
dm. Decimeter.
Do., or do Ditto.
Doz., or doz. Dozen; dozens.
Dr. Debtor; doctor.
dr. Dram; drawer.
D. S. C. Distinguished Service Cross.
D. S.M. Distinguished Service Medal.
D. V. *Deo volente* (L., God willing).
Dwt., or dwt. Pennyweight.

E

E. East; English.
Eccl., or Eccles. Ecclesiastes; Ecclesiastical.
Ed. Editor.
Ed., or ed. Edition.
Edw. Edward.
e. g. *Exempli gratia* (L., for example).
E. I. East Indies; East India.
E. M. F. Electro-motive force.
Eng. England; English; engraving.
Engin. Engineering.
Eph. Ephesians; Ephraim.
Epiph. Epiphany.
Epis. Episcopal.
Eq., or eq. Equal; equivalent.
Er Erbium.
Esq., or Esqr. Esquire.
et al. *Et alibi* (L., and elsewhere); *et alii* (L., and others).
etc. *Et cetera* (L., and others, and so forth).
et seq. *Et sequens* (L., and the following).
Ex. Example; exception; Exodus.
Exch. Exchequer; exchange.
exc. Excellent; except; excepted; exception.
exp. Export; express.
exr. Executor.
exrx. Executrix.
ext. External; extinct; extra; extract.

F

F Fluorine.
f Farthing; fathom; feet; feminine; fine; flower; folio; foot; forte; franc.
F. Fahrenheit; Father; Fellow; French; Friday.
F. A. M. Free and Accepted Masons.
fac. Facsimile.
F. A. I. A. Fellow of the American Institute of Architects.
fam. Familiar; family.
Fe *Ferrum* (L., iron).

Feb. February.
ff. Folios; forte.
F. F. V. First families of Virginia.
Fl., or fl. Florin, florins.
Fla. Florida.
fo. Folio.
F. O. B., or f. o. b. Free on board.
Fr. France; French.
Fri. Friday.
Ft., or ft. Foot; feet; fort.
fr. Fragment.
freq. Frequent.
fur. Furlong.
fut. Future.

G

g Gauge; genitive; gram; guide; guinea *or* guineas; gulf.
G. German.
Ga. Georgia; gallium.
G. A. General Assembly.
Gael. Gaelic.
Gal. Galatians; Galen.
Gal., or gal. Gallon *or* gallons.
G. A. R. Grand Army of the Republic.
G. B. Great Britain.
Gen. Genesis; general; Geneva.
Geo. George.
Geog. Geography.
geol. Geology.
Geom. Geometry.
Ger., or Germ. German.
Gi., or gi. Gill; gills.
Gov. Governor.
Gr., or gr. Grain; grand; great.
Gram. Grammar.
Gro., or gro. Gross.

H

H Hydrogen.
h. Harbor; hard; height; high; hour; husband.
ha. Hectare.
Hab. corp. Habeas corpus.
H. B. C. Hudson's Bay Company.
H. B. M. His (*or* Her) Britannic Majesty.
H. C. House of Commons; Heralds' College.
Hdkf. Handkerchief.
Heb., or Hebr. Hebrew, Hebrews.
Hg *Hydrargyrum* (L., mercury).
H. H. His (*or* Her) Highness; His Holiness (the Pope).
Hhd., or hhd. Hogshead.
H. L. House of Lords.
hl Hectoliter.
H. M. His (*or* Her) Majesty.
hm Hectometer.
H. M. S. His (*or* Her) Majesty's Steamer, Ship, *or* Service.
Hon. Honorable.
Hort. Horticulture; horticultural.
H. P. Horse Power.
H. R. House of Representatives.
Hr., or hr. Hour.
H. R. H. His (*or* Her) Royal Highness.

I

I Iodine.
I. Idaho; *Im'perator* (L., Emperor; island.
Ia. Iowa.
Ib., ib., Ibid., or ibid. *Ibidem,* in the same place.
Ich., or Ichth. Ichthyology.
id *Idem* (L., the same).
Ida. Idaho.
I. e., or I. E. *Id est* (L., that is).
Ill. Illinois.
Imp. Imperial.
In., or in. Inch; inches.
Incog. *Incognito,* unknown.
Ind. India; Indian; Indians; Indiana.
Ind., ind., Indic., or indic. Indicative.
Inf., or inf. Infinitive.
In loc., or in loc. *In loco,* In its place.
inst. Instant (the present month).
Int., or int. Interior; interjection; internal; international; interpreter; intransitive.
Inv. Invoice.
I. O. F. Independent Order of Foresters.
I. O. G. T. Independent Order of Good Templars.
I. O. O. F. Independent Order of Odd Fellows.
I. O. U. I owe you (an acknowledgment for money).
Ir. Ireland; Irish; iridium.
is. Island; isle.
Is., or Isa. Isaiah.
I. T. Indian Territory.
It., or Ital. Italian; italic; Italy.
I. W. W. Industrial Workers of the World.

J

J. Judge; Justice; Julius.
Jan. January.
J. C. Jesus Christ; Julius Caesar.
Jona. Jonathan.
J. P. Justice of the Peace.
J. Prob. Judge of Probate.
Jr., or jr. Junior.
Jul. July.
Jun., or jun. Junior.

K

K. King; knight; (L., kalium); potassium.
Kan., or Kans. Kansas.
K. B. Knight of the Bath.
K. C. B. Knight Commander of the Bath.
Ken., or Ky. Kentucky.
K. G. Knight of the Garter (in Great Britain).
kg. Kilogram.
kl. Kiloliter.
km. Kilometer.
K. P. Knights of Pythias.

L

L. Lady; Latin; Law; Left; Lord; Low; Lithium; London.
L., or l. Lake; lane; latitude; League; Line; Link.

L., Lb., lb., or ℔. *Libra,* A pound in weight.
L., l., or £ A pound sterling.
l. Liter.
La. Louisiana; Lanthanum.
Lat. Latin.
Lat., or lat. Latitude.
l. c. Lower case; *Loco citato* (L., in the place cited).
L. C. M. Least Common Multiple.
Lea., or lea. League.
Leg. *Legato* (L., smoothly).
Leg., or Legis. Legislature; legislative.
Leip. Leipzig, or Leipsic.
Lev. Leviticus.
Lex. Lexicon.
L. I. Long Island; Light Infantry.
Li or L Lithium.
Lib., or lib. *Liber* (L., book).
Lieut., or Lt. Lieutenant.
Linn. Linnæus.
Lit. Literature.
Long., or long. Longitude.
Loq. *Loquitur* (L., he, *or* she, speaks).
L. S. D., £ s. d., or l. s. d. *Libra, Solidi, Denarii,* Pounds, Shillings, Pence.
Lu. *Lutecium.*

M

m. Male; manual; married; masculine; measure; medicine; medium; meridian; meter; middle; mile; mill; minute; month; moon; morning; mountain.
M. Agr. Master of Agriculture.
Manit. Manitoba.
M. Majesty; Manitoba; Marshal; Marquis; Master; Member; Militia; Monday; *Monsieur.*
M. A. Military Academy; Master of Arts.
Maj. Major.
Mar. March; maritime.
Mass. Massachusetts.
Math. Mathematics.
Matt. Matthew.
M. C. Member of Congress.
M. D. *Medicinæ Doctor* (L., Doctor of Medicine).
Md. Maryland.
Mdlle. *Mademoiselle.*
M. E. Methodist Episcopal; Military; mining, *or* Mechanical Engineer.
Meas. Measure.
Mem. Memorandum; memento; memoir; memorial.
Messrs. *Messieurs;* Gentlemen.
Mg Magnesium.
Mg. Milligram.
Mich. Michigan.
Min. Minute.
Minn. Minnesota.
Miss. Mississippi.
ml. Milliliter.
Mlle. *Mademoiselle*
mm. Millimeter.
Mme. Madame.
Mn. Manganese.
Mo. Missouri; molybdenum.
Mon., or Mond. Monday.
Mons. *Monsieur, or* Sir.
Mont. Montana.
Mos., or mos. Months.
M. P. Member of Parliament.
M. P. C. Member of Parliament, Canada.
Mr. Master *or* Mister.
Mrs. Mistress (as an abbreviation pronounced missis).
M. S. Master of Science.
MS Manuscript.
Mt. Mount, *or* Mountain.
Mts. Mountains.
Mus. Music; musical; museum.

N

N. Nitrogen.
n. *Natus* (L., born); nephew; neuter; new; nominative; note; noun; number.
N. Nationalist; Navy; Noon; Norse; North; Northern; nail.
N. A. North America.
Na. *Natrium* (L., Sodium).
N. A. S. National Academy of Sciences.
Nb Niobium.
N. B. New Brunswick; North Britain; *Nota bene* (L., note well, *or* take notice).
N. C. North Carolina.
N. D. No date; North Dakota.
N. Dak. North Dakota.
N. E. Northeast; New England.
nem. con. *Nemine contradicente* (L., no one contradicting; unanimously).
Neth. Netherlands.
Neut., or neut. Neuter.
Nev. Nevada.
N. F. Newfoundland.
N. H. New Hampshire.
Ni. Nickel.
N. J. New Jersey.
North Latitude. N. L., or N. Lat.
N. M. New Mexico.
No Norium.
No., or no. *Numero,* number.
N. O. New Orleans.
Nom., or nom. Nominative.
Nor., or Norm. Norman.
Norw. Norway; Norwegian.
Nov. November.
N. P. Notary Public.
N. S. Nova Scotia; new series; not specified.
Nux vom. Nux vomica.
N. W. Northwest.
N. W. T. Northwest Territory.
N. Y. New York.
N. Z. New Zealand.

O

O. Ohio; oxygen; old.
Ob., or ob. *Obiit* (L., died).
Obj., or obj. Objective; objection.
Obt., or Obdt. Obedient.

Oct. October.
O. F. Odd Fellows.
O. K. All correct.
Ont. Ontario.
Op. Opposite; opus; opera.
Ore. Oregon.
Ornith. Ornithology.
Os. Osmium.
Oxf. Oxford.
Oz., or oz. Ounce; ounces.

P

P Phosphorus.
p. Page; part; participle; past; penny; *piano* (L., softly); pint; pipe.
Pa. Pennsylvania.
p. a. Participial adjective.
Par. Paragraph.
Parl. Parliament; Parliamentary.
Part., or part. Participle.
Pass., or pass. Passive.
Pb *Plumbum* (L., lead).
P. C. Privy Council (or Councilor).
Pd. Paid; Palladium.
P. E. Protestant Episcopal.
P. E. I. Prince Edward Island.
Pent. Pentecost.
Per an., or per an. *Per annum;* by the year.
Per cent. or pr. ct. *Per centum* (L., by the hundred).
Perf., or perf. Perfect.
Pg. Portuguese.
Ph. B. *Philosophiæ Baccalaureus* (L., Bachelor of Philosophy).
Ph. G. Graduate in Pharmacy.
Phil., or Phila. Philadelphia.
P. I. Philippine Islands.
Pinx., or pinx. *Pinxit* (L., he *or* she painted it).
Pk., or Pks. Peck; pecks.
Pkgs. Packages.
Plff. Plaintiff.
Plur., or plur. Plural.
P. M. Postmaster; Past Master; Past Midshipman; *Post Meridiem* (L., afternoon).
P. M. G. Postmaster-general.
P. O. Post Office; Province of Ontario.
P. O. D. Post Office Department; Pay on Delivery.
P. O. O. Post Office Order.
Pop., or pop. Population.
Port. Portugal; Portuguese.
Pos., or pos. Positive; possessive.
pp. Pages.
p. p. Past participle.
P. P. C. *Pour prendre congè* (Fr., to take leave).
p. pr. Present participle.
P. Q. Previous question; Province of Quebec.
Pr. Priest; Prince.
Pr., or pr. Preposition; pronoun; price; present.
P. R. Porto Rico.
Prep., or prep. Preposition.
Pres. President.
Pres., or pres. Present.
Prin. Principal.
Prof. Professor.
Pron., or pron. Pronoun.
Pros. Prosody.
Prot. Protestant.
Pro., or pro tem. *Pro tempore* (L., temporarily).
Prov. Proverbs; province.
Prox., or prox. *Proximo* (L., next; of the next month).
Prus. Prussia; Prussian.
P. S. Privy Seal; passenger steamer; *post scriptum* (L., postscript).
Ps., or Psa. Psalm, Psalms.
Pt Platinum.
Pt., or pt. Pint; part; payment; point; port.
Pub. Doc. Public Documents.
Pwt., or pwt. Pennyweight.
Incognito, Unknown.

Q

Q. *Quadrans* (L., a farthing); quart; quasi; queen; query; question; quintal; quire; Quebec (province).
Q., or Qu. *Quintus.*
Q. B. Queen's Bench.
Q. C. Queen's Counsel; Queen's College.
Q. E. D. *Quod erat demonstrandum* (Which was to be demonstrated).
Ql. Quintal.
Q. M. G. Quartermaster General.
Qr., or qr. Quarter (28 pounds); quire.
Q. S., or q. s Quarter section; *Quantum sufficit* (L., a sufficient quantity).
Qt., or qt. Quart; quantity.
Qu. Queen; Question.
Ques. Question.
Q. V., or q. v. *Quod vide* (L., which see).

R

r. Railroad; railway; rare; received; rector; Regina (L., queen); resides; retired; *rex* (L., king); right; river; rises; road; rod; rood.
R. Rabbi; Radical; Reamur; Republican; response (Church Service Books); royal.
Ra Radium.
R. A. Royal Academy; Rear Admiral; Royal Arch.
Rad., or rad. Radix; root; radical.
Rb. Rubidium.
R. C. Roman Catholic Church.
Rec'd. Received.
Rec. Sec. Recording Secretary.
Rect. Rector; receipt.
Ref. Reformed; reformer; Reformation; reference.
Regt. Regiment.
Rep. Representative; republic; report; repeat; reporter.
Rev. Revelation; revolution; review; revenue; revise.
Rev. Reverend.

Rev. Ver. Revised Version.
Rh Rhodium.
R. I. Rhode Island.
Rich. Richard.
R. I. P. *Requiescat in pace* (L., may he [*or* she] rest in peace).
Riv., or riv. River.
Robt. Robert.
R. R. Railroad.
Rs. Rupees.
R. S. V. P. *Rèpondez s'il vous plaît* (Fr., answer).
Rt. Hon. Right Honorable.
Rt. Rev. Right Reverend.
Ru. Ruthenium; runic.
Russ. Russia; Russian.
R. V. Revised Version.
Ry. Railway.

S

S Sulphur.
S., or s. Sign; south; Saint; Sunday; Saturday; Signor; Saxon; scribe; *Sextus;* second; shilling; sun; sets; see; solo; stem; section; series; singular; son; succeeded.
S., or Sab. Sabbath.
S. A. South America; South Africa; South Australia.
Sas. Saskatchewan.
Sat. Saturday.
Sax. Saxon; Saxony.
Sb *Stibium* (L., antimony).
S. C. South Carolina; Supreme Court.
s. caps., s. c. Small capitals.
Sc., or sc. *Scilicet* (L., namely).
Sc. Scandium.
Sc., or Sculp. *Sculpsit* (L., he, or she, carved it).
Scand. Scandinavian.
Sch. Scholium; schooner.
Scot. Scotland; Scotch; Scottish.
Scr., or scr. Scruple.
Script. Scripture; Scriptural.
S. Dak., or S. D. South Dakota.
S. E. Southeast.
Se Selenium.
Sec. Secretary.
Sec., or sec. Second; section.
sec. Secant.
Sec. Leg. Secretary of Legation.
Sect., or sect. Section.
Sen. Senate; Senator; Senior.
Sept. September, *Septuagint.*
Seq., or seq. *Sequentes, or sequentia* (L., the following; the next).
Serg. Sergeant.
Sh., sh., S., or s. Shilling.
Si Silicium; Silicon.
S. I. Sandwich Islands; Staten Island.
Sing., or sing. Singular.
S. J. Society of Jesus.
Skr. Sanskrit.
S. Lat., or S. L. South Latitude.
Slav. Slavonic; Slavonian; Slavic.
Sn *Stannum* (L., tin).
S. O., or s. o. Seller's option.
Sol. Solomon; solution.
Sov. Sovereign.
Sp. Spain; Spanish; Spirit.
S. P. *Sine prole* (L., without issue, childless).
Sp. gr. Specific gravity.
S. P. Q. R. Small profits, quick returns.
sq., sqq. *Sequens, Sequentes* (L., and the following).
Sq., or sq. Square.
Sq. ft., or sq. ft. Square foot, or feet.
Sq. in., or sq. in. Square inch, or inches.
Sq. m., or sq. m. Square mile, or miles.
Sq. r., or sq. r. Square rod, or rods.
Sq. yds. or sq. yds. Square yard, or yards.
Sr. Sir, or Senior; strontium.
SS., or ss. *Scilicet,* (L., namely); *Semis* (L., half).
St. Saint; street; stone; strait; *Stet* (L., Let it stand).
S. T. D. Doctor of Sacred Theology.
Stat. Statute; statutes; statuary.
Ster., or Stg. Sterling.
Subj., or subj. Subjunctive.
Subst., or subst. Substantive; substitute.
Suff., or suff. Suffix.
Sun., or Sund. Sunday.
Sup. Superior; supplement; superfine; superlative.
Supt. Superintendent.
Surg. Surgeon; surgery.
Surv. Surveying; surveyor.
S. W. Southwest.
Sw. Swedish; Sweden.
Swit., or Switz. Switzerland.
Syn., or syn. Synonym.
Synop. Synopsis.

T

T., or t. Tenor; Titus; Tullius; Tuesday; town; township; territory; ton; tun; Testament.
Ta. Tantalum.
Tan., or tan. Tangent.
Te Tellurium.
Tel. Telegram; telegraph; telephone.
Tenn. Tennessee.
Ter. Territory.
Teut. Teutonic.
Tex. Texas.
Th. Thursday; Thomas; Thorium.
Theor., or theor. Theorem.
Thess. Thessalonians.
Thos. Thomas.
Thurs. Thursday.
Ti Titanium.
Tim. Timothy.
Tit. Titus; title.
Tl Thallium.
Topog. Topography; topographical.
Tp. Township.
Tr. Translation; translator; transpose; treasurer; trustee; terbium.
Trig. Trigonometry; trigonometrical.
Trin. Trinity.

Tu	Thulium.
Tu., or Tues.	Tuesday.
Typog.	Typography; typographical.

U

U	Uranium.
U. K.	United Kingdom.
Ult., or ult.	*Ultimo,* last; of the last month.
Unit.	Unitarian.
Univ.	University.
U. S.	United States.
U. S. A.	United States of America; United States Army.
U. S. M.	United States Mail; United States Marine.
U. S. N.	United States Navy.
Ut.	Utah.
Ux.	*Uxor,* wife.

V

V	Vanadium.
V., or v.	Verb; verse; village; vocative; volume; violin; *vide* (L., see).
Va.	Virginia.
Vat.	Vatican.
V. C.	Vice Chancellor; Vice Chairman; Victoria Cross.
Ven.	Venerable.
v. i.	Verb intransitive.
Vice Pres.	Vice President.
Vid., or vid.	*Vide* (L., see).
Viz., or viz.	*Videlicet* (L., namely, to wit).
Vol., or vol.	Volume.
V. P.	Vice President.
V. R.	*Victoria Regina;* Queen Victoria.
V. Rev.	Very Reverend.
Vs., or vs.	*Versus,* against.
V. S.	Veterinary Surgeon.
Vt.	Vermont.

W

W.	West; William; Wednesday; Welsh; Warden; Wolframium, (Tungsten).
W. A.	West Africa; West Australia.
Wash.	Washington.
W. C. T. U.	Women's Christian Temperance Union.
Wed.	Wednesday.
Westm.	Westminster.
wf., or w.f.	Wrong font.
Wk., or wk.	Week.
W. I.	West India; West Indies.
Wis.	Wisconsin.
Wm.	William.
Wt., or wt.	Weight.
W. Va.	West Virginia.
Wyo.	Wyoming.

X

X	Xenon.
Xper., or Xr.	Christopher.

Y

Y	Yttrium.
Y., or Yr.	Year.
Yb., or yb.	Yearbook.
Yd., or yd.	Yard; (Yds.) yards.
Y. M. C. A.	Young Men's Christian Association.
Y. P. S. C. E.	Young People's Society Christian Endeavor.
Y. W. C. A.	Young Women's Christian Association.

Z

Zn	Zinc.
Zool.	Zoology; zoological.
Zr	Zirconium.

Abelard, ăb′e-lärd (1079-1142), an eminent French philosopher—the lover of Heloise. He was born near Nantes. He gave his share of his father's property to his younger brothers, and devoted himself to a life of scholarship. He went to Paris for an education. This was before the day of printing. Manuscripts were written in Latin; the lecturers spoke Latin; the students conversed, not in French, but in Latin.

Pierre was Abelard's name at home, but his fellow students gave him a Latin nickname meaning "Bacon-licker." Young Pierre changed the nickname slightly to "Habelardus," meaning "Bacon-haver," whence the name Abelard, by which he is known. Abelard was a remarkable student. He was particularly fond of logic and disputation. He became a favorite of the leading professor, but argued with him so persistently as to turn friendship into enmity. Abelard had fluency and elegance of speech. He became noted as the greatest speaker and teacher of his day.

In the history of philosophy, he is considered one of the "school men," a name given to the scholars of the Middle Ages. The doctrines of Abelard were of intense interest to the thinking young men of his day. He emphasized the duty of obeying one's conscience. He defined sin, not merely as a departure from what is good in itself, but as doing something which the doer himself felt to be wrong. As a deduction from this position, he claimed that a person might commit an act, wrong in itself, but not a sin so far as the doer is concerned. It follows from this doctrine that if a person thinks it wrong to commit an act, he is guilty in doing it, even though the act in itself be not wrong.

Assuming that God is all powerful and all wise, and that his acts are to be unquestioned, Abelard answered the query of whether God can do more than he really

does do, by saying that, if only the divine power is to be taken into consideration, God can do more than he does, but that, if the divine wisdom be considered, God cannot do more than he now does.

As to knowledge, Abelard declared that it is our duty to investigate, and that proper doubt is the open door to investigation. In matters of faith, this eminent teacher laid down the principle that reason must be the basis of faith, for without reason faith cannot be sure of its truth. In this latter doctrine, in particular, Abelard came into conflict with the church, which very naturally insisted that the teachings of the church were authoritative and must not be inquired into. He was driven out of several positions. The story of his fleeing into the wilderness, followed by crowds of loyal students desirous of hearing his lectures, is one of thrilling interest. His doctrines were condemned by church councils. To escape excommunication, he was obliged to recant and to burn his works in public.

Abelard was a profound student of philosophy and theology, the learned subjects of his time. He is to be regarded as an early exponent of independence of thought. He was the most eminent thinker of his day. The course of Abelard's life never ran smoothly. At the age of forty he ran away with Heloise, his beautiful pupil, the niece of Canon Fulbert. They were united by a secret marriage which Heloise afterward denied from a fear of obstructing Abelard's progress in the church, no married man being permitted to enter the priesthood. Heloise's relatives took a brutal revenge by breaking into Abelard's apartments and mutilating him in a manner that made him ineligible for high place in the church. Abelard entered a monastery in deep humiliation. Heloise became a nun. Later Abelard founded a chapel and hermitage, called Paraclete, and when he became an abbot, he gave the hermitage to Heloise and her sisterhood for a dwelling. On Abelard's death, his body was delivered to Heloise who buried him at Paraclete. For twenty years she watched his grave and when she died she was buried beside him. In 1817 the remains of Abelard and Heloise were removed to the cemetery of Père Lachaise at Paris, and were buried in the same sepulcher. A fine sarcophagus with the recumbent figures of the lovers represented on the cover is surmounted by a Gothic canopy. Some of the stones of this monument were brought from the buildings of Paraclete. There is never a lack of fresh wreaths and bouquets of flowers, left by strolling lovers, who regard the tomb of Abelard and Heloise as the shrine of disappointed love.

See PÈRE LACHAISE; SCHOLASTICISM.

Ab'erdeen, a flourishing city of northeastern South Dakota, located in the fertile valley of the James River midway between the eastern boundary of the state and the Missouri. It is the most important railway center in this section of the state and has developed a considerable wholesale trade. The business district is well paved and there are many fine business blocks. Artesian wells furnish an abundant water supply. Manufactories are springing up, among them being clothing, harness and saddle, gasoline engine and numerous lesser establishments. Here is located the Northern Normal and Industrial School, and the town has a particularly fine high school building.

The population (1920) was 14,537.

Aberdeen, Wash., is well situated at the head of Grays Harbor, at the junction of the Chehalis and Wishkah rivers, 15 miles from the Pacific Ocean. In the heart of the northwestern lumber industry, it has about 20 lumber and shingle mills, besides factories, and salmon and clam canneries. It is one of the largest lumber shipping cities in the United States. Its population in 1920 was 15,337.

Ab'erdeen, the chief seaport of northern Scotland. It is situated near the mouth of the river Dee, and on the German Ocean, sixty odd miles northwest of Edinburgh. Population, 158,969. The city is of local importance in the shipping of cloth, both woolen and linen, cotton yarn, paper, fish, grain, and cattle. It is the fourth port of Scotland, and is noted as a center of the granite industry.

Aberdeen granite takes a fine polish. An ancient seat of learning, dating from 1494, one of four Scottish universities, is located at Aberdeen. It has seventy-nine professors, divided into four faculties,—arts, divinity, law, and medicine. There are about a thousand students. An art gallery, an art school, a fine old cathedral, and sixty churches are in keeping with the reputation of the city for learning and culture. The University sends a member to Parliament. Aberdeen is also one of the ancient centers of golf playing. The golf links extend along the seashore for some distance, and are noted in the history of the game. See SCOTLAND.

Ab'ernethy, John (1764-1831), an eminent English surgeon. A native of London. Surgeon of St. Bartholomew's hospital. He was a skillful operator and became so famous for lectures on anatomy and surgery that the authorities found it necessary to build him a large lecture room. He was a brilliant, witty speaker, kind-hearted but blunt. A characteristic anecdote runs to the effect that he gave a rich patient a sure cure for the gout: "Live on sixpence a day and earn it."

Aberra'tion. This is a term used in physics for the fact that lenses and curved mirrors are unable to form true, flat images, or images devoid of color. It is "spherical aberration" when the reflected rays from the curved surface do not focus at a point, as is seen on the surface of a pail or cup of milk when illuminated obliquely by a lamp or candle, giving rise to the figure known as "the cow's foot in the milk."

The fact that the different colors into which white light is separated by a lens do not focus at the same point, gives rise to rainbow-hued fringes about the image. This is called chromatic aberration, a defect largely overcome by combining two kinds of glass in the lens which is then known as achromatic.

In a somewhat different sense, the word aberration is used as describing the cause of the apparent displacement of a star or other celestial body from its place in the sky.

Abilene, Tex., 150 miles west of Fort Worth, is the county seat of Taylor County. It is in the center of a cotton and fruit growing district, and these two products are the principal articles of trade. It has cotton gins, cotton oil mills and a flour mill. Situated here are Simmons College, McMurray College, Abilene Christian College and a State Epileptic Colony. Population, in 1920, 10,274.

Abolitionists, in American history, a name applied to those who urged the immediate and utter abolition of slavery. The term dates from the founding, in 1831, by William Lloyd Garrison, of a paper called *The Liberator*. The abolitionists were confined chiefly to the North. They were bitter in their denunciation of the fugitive slave law, and promoted the "underground railroad," through whose agency many slaves found their way to freedom. The abolitionists were at no time a political party or organization. Wendell Phillips and Charles Sumner were conspicuous in the movement. John Brown's raid at Harper's Ferry was regarded as the logical outcome of the methods advocated by the abolitionists. See TANEY; UNDERGROUND RAILROAD; BROWN; GARRISON; PHILLIPS; WHITTIER; FREE SOIL PARTY.

Abraham, in Hebrew lore, the father of the Israelites and of the Arabian tribes. According to Genesis xii, he and his immediate household left home and kindred in heathen Mesopotamia and journeyed westward to the Holy Land under a divine command, coupled with a gracious promise, "And I will make of thee a great nation, and I will bless thee, and make thy name great; and thou shalt be a blessing; And I will bless them that bless thee, and curse him that curseth thee; and in thee shall all families of the earth be blessed." Some Bible critics are pleased to believe that Abraham was a military leader at the head of a band of nomadic followers, or that he was a mythical personage whose experience at the oak of Mamre, at Hebron, and in Egypt, typifies the early wanderings of the Semitic race. The release of his son Isaac from the altar, and the offering of a ram instead, may indeed be symbolical of the national change from hu-

man sacrifice to that of animals; but there is no reason to suppose that Abraham is not in some degree an historical personage, around whom more or less legendary accounts have gathered. The Bible story certainly loses in the reading by regarding Abraham as other than "an honest, peaceable, generous, highminded patriarch; a prince, rich, powerful, and honored, fitted for rule, and exercising power with prudence." Historians place the migration of Abraham, founder of the Hebrew race, at about 2000 B. C.

The entire Biblical narrative, to the day when Abraham bought the cave of Machpelah and buried Sarah there, fits in admirably with what we know of Arabic life and manners, and could be identified with southwestern Asia were all mention of place omitted. At all events the Hebrews and Arabs are closely related in language, literary ideals, features, and in many respects intellectually. Whether they are descended from Isaac and Ishmael and the six other sons of Abraham, or whether the Abraham of Scripture refers to an individual ancestor or to a parent people that migrated westward, the Bible story loses none of its interest or instructiveness.

See JEWS.

Abruzzi. See ARCTIC REGIONS.

Absalom, the third son of David, King of Israel. The story of Absalom is interesting. His beauty; the affront to his sister; the slaying of his brother; his flight, exile, and recall; his burning the standing grain of his cousin Joab; Joab's intercession for him at court; his popular ways; his rebellion and foolish advisers; the adverse battle in the wood of Ephraim; his tragic death in the boughs of an old oak at Joab's hand; his burial beneath a great heap of stones, and David's grief for a favorite though disobedient son, "are they not set forth" in II Samuel, beginning at the thirteenth chapter and following? A rock-hewn sepulcher, with an attic of masonry adorned with Ionic columns and a Doric frieze, is pointed out at Jerusalem as "Absalom's Tomb." In one of his celebrated satires John Dryden pictures Monmouth as Absalom—the type of undutiful sons, a monster of ingratitude.

Absentee Landlord, a term applied to land owners who live abroad. The term was originally applied to the owners of Irish estates, who lived customarily in London or elsewhere, managing their property through resident agents. Many Irish riots may be traced to the hard dealings of agents under instructions to collect rents to be expended, as the peasantry thought, and no doubt justly, in more or less riotous living. The evil of absenteeism has been remedied in Ireland by an act authorizing tenants of lands to purchase their holdings at a fair value, the money for that purpose being loaned them, on the land as security, by the government. A somewhat similar state of absenteeism existed in Hungary after its union with Austria; but of late the Hungarian nobles have shown more pride in residing amongst their own people. In America the term is used to refer to wealthy Americans who prefer to live abroad on the income derived from their American property. See IRELAND.

Ab'sinthe, an alcoholic beverage. It is prepared from alcohol by the addition of oil of wormwood and other aromatic oils, particularly the oil of anise. Its characteristic constitutent, however, is the somewhat poisonous oil of wormwood, to which the deleterious properties of the cordial are attributable. The green color of the liquor, due in part to the oil of wormwood, is heightened by the addition of the juice of spinach, nettles, or parsley. Most samples of absinthe also contain sugar. On the addition of water the essential oils are thrown out of solution and the liquid becomes turbid. The cordial is taken by adding a small portion to a glass of water. It is consumed largely in France, but its use has extended to England and America. Absinthe is considered a pernicious beverage. It is believed to undermine the system, to bring on the alcohol habit, and to produce dementia more rapidly and certainly than any other liquor known. Its use increased rapidly. The sales in France for 1905 amounted to 5,557,529 gallons. In 1915, the government prohibited its use in the country. Its use had previously been forbidden to of-

ficers of the army and navy, and its importation into the United States has been forbidden since Oct. 1, 1912. See ARTEMISIA.

Absorp'tion, is a name given to the process by which living organisms take up the soluble, nutritive materials needed for their growth. The physical and chemical laws governing the passage of liquids through the membranous cell walls are fairly well understood, but as to how the protoplasm of the cell regulates this flow is still largely a mystery. Our ordinary plants give off by evaporation large quantities of water, and this loss must be balanced by a constant absorption through which nourishment is obtained. The absorption of the prepared food materials by the walls of the alimentary canal, chiefly in the small intestine, is another example. The lymphatics and lacteals are organs of absorption.

Abstract of Title, a document setting forth in an orderly manner the essential facts of all patents, deeds, mortgages, releases, or other transactions affecting the title to a particular tract of land. In America a complete abstract states how the original owner came into possession, and describes all transfers to the present time. It should also show what taxes, if any, remain unpaid, and whether any judgments or other obligations exist which render the present owner unable to give a clear title. Ordinarily the seller of a tract of land is expected to furnish such an abstract for the buyer or his attorney to inspect, but he is under no legal obligation to do so. Many English abstracts begin with Doomsday Book. In Louisiana an abstract is likely to begin with some Spanish grant two centuries old. In the states of the Middle West the first entry is likely to cite a government patent conveying a homestead, preëmption quarter, tree claim, or scrip claim to the original settler.

Abyssinia, ăb'ĭs-sĭn-ĭ-a, a country of Africa. The name is Arabic, signifying mixture, and has reference to the mixed population. Abyssinia occupies a rugged, inland plateau, situated in the interior of the triangle formed by the Nile, the Red Sea, and the Indian Ocean. Abyssinia has no seacoast. The general surface is granitic, and lies about 8,000 feet above the sea, with huge masses of volcanic rock rising to an altitude of 15,000 feet. The total area, including dependencies, is over 200,000 square miles—about twice that of Nevada. The population is estimated at nine or ten millions. Certain dependent tribes belong to the black race; but the people of Abyssinia proper are a mixture of tribes allied to the swarthy Arabs and Egyptians. They are rude, but they are whites, not negroes. Abyssinian history in Africa is, in a way, similar to that of Switzerland in Europe. Abyssinia resisted Egyptian aggression of old. It was never subjugated by the Romans or by the Moslems. European nations have taken possession of the valley of the Nile on the west, and of the seacoast on the east; but Abyssinia of the mountains has fought for its freedom, and is yet independent under a native ruler. The monarch is styled by the native's King of Kings Menelik II was crowned in 1889. On his death in 1913, Lidji Jessu, his grandson, became King. He was succeeded by Menelik's daughter, Waizern Zauditu (Empress), in 1917.

Lidji Jessu, however, reigned only three years; he was deposed by public proclamation on September 27, 1916, and Waizeru Zauditu, daughter of Jessu's predecessor, Menelik, was nominated Empress. She was crowned at Addis Abbaba on February 11, 1917. Upon the Empress' accession, Ras Taffari was proclaimed heir to the throne, and he wields actual power to a great extent.

The political institutions of Abyssinia are feudal in character, analogous to those of mediaeval Europe, and slavery is a well established institution. Cabinet government was introduced in 1919, but swiftly fell into disuse. The army numbers about 100,000, and is armed with modern rifles.

The people are not disposed to raise crops by tilling the soil. They do raise cotton, sugar cane, date palms, and grapes, wheat, barley, millet, hops, coffee, and tobacco in small quantities, but they prefer grazing. Cattle, sheep, goats, small horses, mules, and donkeys are reared.

There are several towns of 5,000 or

more population. Telephone lines extend into the interior. A railroad from the coast has been extended 193 miles into the southeastern part of Abyssinia, but for the most part transportation is carried on by trains of mules, packhorses, donkeys, and camels, over mere mountain trails. The natives are eager to buy cotton and woolen cloth. Turkey red is a favorite color. American merchants sell them $2,000,000 worth of gray cotton shirting a year. Soap, incense, thread, candles, tinware, umbrellas, beads, looking glasses, razors, knives and swords, iron and brass wire, guns and ammunition are in demand. The natives have hides, coffee, civet, ivory, beeswax, gums, ostrich feathers, and gold to sell. Trade is carried on chiefly with the British port of Aden.

There is a wide range of climate and vegetation. A belt near the seacoast is torrid, and is characterized by the indigo, date palm, banana, and ebony trees of the tropics. The slopes of the mountains produce the oranges, lemons, olives and the grapes, grains, grasses, and garden vegetables of cooler climes. The elevated mountain regions are given over to pasturage, with here and there patches of oats and barley. The meadows and many of the plants found in the upper regions of Abyssinia remind the traveler of similar scenes in the Alps. In the winter the snow accumulates in the mountains and goes off in the spring with heavy rains, swelling the Blue Nile and the Atbara, two torrents that flow westward into the Nile and produce its annual inundation.

See ADEN; AFRICA.

Acacia, ȧ-kā′shȧ, a genus of shrubs and trees belonging to the pea family. There are between four and five hundred species. The acacia is a native of every continent except Europe; but it has been introduced into England and southern Europe from Africa and from Australia. The North American locust is closely related to the acacias, as are also the mimosae, or sensitive plants, the lupines, sennas, and laburnums, as well as all the varieties included under the general name leguminosae, or pod-bearing plants. In some species the twice-pinnate leaves are reduced to mere rudiments, and the leaf stalk is broad and flat, with one edge toward the sun. Several kinds yield the gum arabic and gum senegal of commerce. The bark and pods of one or more kinds are used for tanning leather. The seeds of one species are used for soap. Catechu, an astringent extract much used by the tanner, and in medicine as a remedy for diarrhoea and dysentery, is obtained from a species found in India. Florists list over fifty acacias as desirable conservatory plants. Some kinds yield valuable and lasting lumber. One species is thought to be the shittim-wood of the Bible.

Academy, a body of persons voluntarily associated to confer on questions of art, science, or literature. The term originated in connection with the school of Plato and his disciples, who walked and talked and learned and taught in the garden of Academus in Athens. In the sense of a school, academy is still used, especially in New England, for a grade of schools, frequently endowed and ably taught, corresponding in a general way to the public high school. The United States Government maintains a military academy at West Point and a naval academy at Annapolis. The preparatory department maintained by many colleges goes by the name of academy. The report of the United States Commissioner of Education for 1907 gives information regarding 1,434 academies having 8,956 instructors and 97,110 students. The number of academies seems to be falling off about one hundred a year.

The general use of the term, however, is to designate a learned society holding meetings for the discussion of important, and especially recent, contributions to knowledge. The academy, using the word with this meaning, dates from the revival of learning in the fifteenth century. Over 20,000 associations now exist with the purpose, and usually the name, of an academy. Many, of course, and these are not to be despised, are merely local, organized to compare fossils, flowers, and birds' eggs; but the number of state, national, and international organizations that issue bulletins and proceedings containing additions to the world's knowledge is really large.

Sometimes they are termed societies, associations, or institutions.

The earliest organization of the sort in this country is the American Philosophical Society at Philadelphia, founded by Benjamin Franklin and his associates in 1743. The American Academy of Boston (1780) has issued many costly volumes devoted to natural history. Similar work has been done by the Academy of Natural Sciences, Philadelphia (1814); the Lyceum of Natural History, New York (1818); the Institute of Natural History, Albany (1824), and many others. The list of historical societies is a long one, and the number of societies organized to promote artistic development is still greater. Of American organizations the greatest is the Smithsonian Institution of Washington, D. C., with a large endowment and the general government behind it. The scientific societies of Montreal, Rio Janiero, and Santiago have published valuable reports. Across the Atlantic there is a long array of royal, imperial, and national academies, institutes, and societies of art, science, and literature. Florence, Rome, Milan, Venice, Paris, Dublin, Edinburgh, London, Berlin, Munich, Pesth, Vienna, Prague, Lisbon, Madrid, Petrograd, Christiania, Stockholm, Copenhagen, Tokio, Madras, and, in short, all considerable cities with claim to intelligence, possess from one to several academies or learned societies under one name or another.

In literature "The Academy" refers especially to the French Academy founded in 1635 by Cardinal Richelieu. It consists of forty members, each with a salary of $300 a year, and three salaried officers. The secretary receives $1,200 a year. The members are popularly called the "Forty Immortals." They fill vacancies in their ranks by ballot. Jealousy at times prevents the selection of the most fitting. Among the publications of the Academy, the chief in importance is an authoritative dictionary of the French language, the first edition of which was published in 1694.

In art circles "The Academy" refers to the Royal Academy of Arts, a British institution founded in 1768 by George III. Sir Joshua Reynolds was the first president. The presiding officer is permitted to write P. R. A. after his name; forty members write R. A., and twenty associates write A. R. A. An annual exhibition of meritorious paintings, sculpture, and designs is held at London.

Aca'dia, a former French colony in North America, now known as New Brunswick and Nova Scotia. To be exact, Acadia was that part of the continent lying east of a line drawn north from the mouth of the Penobscot to the St. Lawrence. At one time it comprised a part of Maine. The word is Micmac, signifying plenty. During Queen Anne's War, the province was annexed by England. The name was changed to Nova Scotia. In a narrower sense, the word has been associated with a region lying immediately on the Bay of Fundy. In 1755, during King George's War, word was sent to the Acadian French in this settlement that they must take the oath of allegiance to England. Very possibly the French priests, on whom the simple peasantry depended for information and guidance, withheld the order. At any rate, the Acadians did not comply. The British authorities feared that the Acadians might prove a source of strength to the French. It was believed also that the Acadians encouraged the Micmac Indians to side with the French against the British. At all events, the region was placed under martial law. The innocent and happy Acadians were driven on board English vessels, and were scattered up and down the Atlantic coast among the various colonies. Families were broken up and never reunited. Those who escaped to the woods were starved into surrender by the utter destruction of their homes, crops, and cattle. A considerable number of the unhappy refugees found their way to Louisiana, where their descendants still reside. It is here that the story of Evangeline and the sufferings of the Acadians, so well told by Longfellow, are current traditions. See EVANGELINE; NOVA SCOTIA.

Acan'thus, a genus of perennial herbs native in the countries of the Mediterranean. The acanthus family contains some 1400 species of herbs and shrubs, chiefly tropi-

cal. The name is from the Greek and signifies a thorn. It has reference to the spines which terminate the lobes of the leaves of certain species. The acanthus proper includes several species, the chief of which are the soft-leaved and the spiny-leaved acanthus. These and other species are cultivated for borders and window plants. The flower stem springs to a height of three feet from the center of a rosette or cluster of handsome, dark green, shining leaves, and bears a spike of large monopetalous, irregular white or yellowish flowers. The stem, leaves, and roots of the plant are mucilaginous. A deep blue dye is obtained from a kindred species growing in Assam. The acanthus is known in British gardens as bear's breech.

The acanthus leaf is noted in art. The leaves that adorn the capital of the Corinthian column are the conventionalized foliage of the spiny-leaved acanthus known to botanists as *Acanthus spinosus*. The acanthus leaf was a favorite design for the ornamentation of the cornice and frieze not only in Grecian but in Roman, Byzantine, medieval, and Renaissance architecture. The acanthus leaf was employed also in decorating vases, drinking cups, platters, and furniture. An acanthus design was adopted for embroidery and other needlework and was used by the house decorator for walls.

Ac'cent, in speaking, a special stress or pressure of the voice giving prominence to a syllable. Emphasis is distinguished from accent in that it makes prominent one or more words, even an entire sentence. The purposes of accent are various; by it a noun may be distinguished from a verb, as ac'cent, accent'; an adjective from a verb, as pre'sent, present'; an adjective from a noun, as expert', ex'pert. The influence of accent in changing the form of words is worthy of note. In many instances the unaccented syllable is dropped in the course of time.

All languages are accented, some to a greater extent than others. The English language is accented very irregularly. This makes it difficult for a foreigner to learn but adds to the flexibility of the language and makes poetry, that is, a variety of poetic forms, possible, since rhythm depends upon the recurrence of accented and unaccented syllables. At the present time the tendency in English is to throw the accent toward the beginning of the word, as, for example, in *per'emptory*. If more than one syllable of a word is accented, one accent is stronger than the others, and is called the primary accent.

The word accent is used also to denote the stress given certain notes in music, and is applied moreover to the intonation peculiar to any language when it is compared with another. We say for instance, "He speaks English with an accent," meaning that the intonation peculiar to the language of some foreigner is noticeable when he speaks English.

Acclimatiza'tion, a change in a plant or an animal enabling it to live in a new locality in a climate for which it was not at first fitted. Indian corn furnishes an excellent illustration. Seed corn from Mexico, for instance, planted in Minnesota would not ripen in time to escape fall frosts; but by choosing early ears of Mexican corn, and planting a little farther north from year to year, and repeating the process, an early corn may be developed which will ripen on the Canadian line. That is to say, corn which changes so that it ripens earlier, becomes acclimated. If northern seed be planted southward, the reverse process takes place. The successive generations or crops descended from early corn seemingly acquire the habit of taking more time, and thus become late corn again.

A similar change may be observed in certain kinds of willows that grow to be trees in temperate climes, but grade off into copse wood and finally appear in arctic latitudes as low shrubs a hand's breadth in height. The seed of the tree would not produce a successful plant beyond the Arctic Circle; but, by traveling north slowly, the descendants of the tree become shrubs and adapt themselves to a short, warm summer, a cool soil, terrific winds, and a long, extremely cold, icebound winter. These willows are acclimated. Under arctic conditions the willows are dwarfed in

size and rough in exterior, but they thrive, and are as thoroughly at home as the arctic fox and the ptarmigan to which they afford shelter.

In the case of animals the process of adaptation is much the same. The thin-blooded, scanty-haired muskrat of the Louisiana bayous would have a hard time in the border swamps of Hudson Bay. Very likely at first it might fail to rear young, or might perish in the deeply frozen shallows; but with time a colony of these southern muskrats would learn to eat northern roots, to choose waters of suitable depth, and to build tepees. Their blood would thicken, their coats of fur would grow denser and longer. They and their descendants would become accustomed to new conditions and be prepared for them. They would be acclimated.

People suffer great distress from extreme changes of climate. The people of England who go to India to occupy government positions, or to engage in commercial undertakings, suffer far more during the first years, and are more subject to pestilence, than is the case after a term of residence has enabled them to become acclimated. Americans are passing through the same experience in the Philippines. The less abrupt the change of climate, the greater the probability of acclimatization. An inhabitant of Mississippi is more likely to get on in the climate of Manila than is a man from Wisconsin. Residence on the Gulf Coast is a good preparation for residence at Panama. Contrariwise a Maine man or a Christiania sailor is a better hand for arctic exploration than a sailor enlisted at Genoa or Marseilles.

For reasons of this sort, migrations of people, plants, and animals follow parallels of latitude more freely than lines running in a north and south direction. Farmers have understood this fact in a general way. Seed grains, fruit trees, cotton, horses, sheep, goats, and swine are not shifted north or south rapidly. A northern farmer desires northern grown seeds and patronizes a northern nursery when he desires to plant an orchard or a fruit garden; but by allowing time for acclimatization, the range through which useful plants may be cultivated, as, for instance, the corn and the apple, has been extended wonderfully.

The term should be distinguished carefully from naturalization. The spread of rats, mice, rabbits, English sparrows, and weeds from Europe and other countries, without particular change of habits or form, is mere colonization or naturalization, not to be confounded with acclimatization. A naturalized plant or animal is not only acclimated, but is so much at home in the new region that it is able to get on and thrive without the help of man. It is to all appearances native.

See CORN.

Accor'dion, a small musical instrument which is played by being held in both hands, the instrument being alternately extended and compressed. A bellows causes the wind to pass over metallic reeds of various sizes, thus producing the sound. Keys are arranged at each end and pressed by the fingers. Little skill is required to play the accordion, as the chords are determined by a mechanical device, the keys varying the pitch. It has often proved on this account a source of amusement to the lonely, but its music is hardly pleasing to the cultivated ear. When the instrument is mentioned images arise of rough lads and buxom lassies dancing to its music on the wide barn floor after some husking bee or apple-paring party of "ye olden time."

Acetylene, a colorless gas having a faint ethereal odor. It is formed in small quantities by direct union of carbon and hydrogen in the electric arc. When calcium carbide is dropped into water, violent effervescence occurs, the carbide is disintegrated, slaked lime is formed, and acetylene passes off as a gas. The gas burns in air with a strongly illuminating, somewhat smoky flame, but gives a white light in a special form of burner in which a flat stream of the gas is burned in a rich supply of air. When used as an illuminant, it is developed in a suitable generator as it is needed. It is commonly used for lighting railway cars, offices, and shops. As prepared from commercial calcium carbide, acetylene is more or less impure, and the

disagreeable odor and alleged poisonous properties are attributable to the impurities. The gas is subject to violent explosion when mixed, even in small proportion, with air and ignited, or when subjected to sudden pressure. It may, however, be safely handled at ordinary pressures, but when contained in cylinders at more than two atmospheres pressure it is readily exploded by any shock.

To produce the calcium carbide required in the commercial manufacture of acetylene, a mixture of pulverized limestone and coke is fused in the intense heat of an electric furnace. The carbide is a hard, grayish, slag-like mass, in which form it is placed on the market. There are extensive calcium carbide factories at Niagara Falls, the electricity required by the furnaces being generated by the water power.

JULIUS HORTVET.

Acetylene Welding. The use of an acetylene flame for welding or cutting metals is a modern addition to the industrial arts and is of great importance. In this process the acetylene flame is raised to a great heat, approximately 3,500° Fahrenheit, by means of oxygen conveyed to a burner or torch with a combination nozzle. This process is known as oxyacetylene welding or cutting. In many shops and factories there is a special plant for the production of acetylene gas, which is piped to any part of the works as it is required. In other cases the acetylene is supplied in steel cylinders containing porous materials such as asbestos, curled hair, etc., in which the acetylene may be safely stored and transported. It cannot safely be shipped in bulk, like oxygen and other gases.

Welding by the oxyacetylene process was introduced into the United States from France in 1905. It is now used for a great variety of repair work, as the apparatus required is simple and compact, so that it can readily be carried from place to place. Welding done by the acetylene flame is one of the processes known as autogenous welding, in which the metals to be joined are melted at their edges instead of being merely softened as in the ordinary process of welding where the union of the metals is completed by hammering. Iron, steel, aluminum, copper, and the various kinds of bronze are now welded by the oxyacetylene process; and all these metals, excepting cast iron, can also be cut successfully by the oxyacetylene torch more rapidly and conveniently than by the machine methods formerly used. Cast iron, however, cannot be cut by the torch, as the free carbon it contains seems to prevent the torch flame from penetrating the metal to the required degree.

In the process of welding two pieces of metal together, the acetylene gas is first lighted at the nozzle of the combination burner, and a stream of oxygen is then turned into it by opening a second valve, and the supply of each gas is regulated so as to produce a flame of the highest possible temperature, at a pressure of from 3 to 12 pounds per square inch. Before the torch is applied the pieces to be welded are scraped and cleaned, so as to remove all impurities that would prevent a perfect union. The torch is fitted with a nozzle suited to the work or material, and this is applied in such a manner as to melt the edges of the metal and also heat the adjacent parts to prevent subsequent cracking. With the torch in one hand, the workman holds in the other a thin rod of metal, called a "melt stick," which he holds in the flame of the torch and applies to the edges to be joined. This as it melts supplies a filling material in the space between the edges of the weld.

Oxyacetylene welding is used in automobile repair shops, in shipyards, and locomotive and car repair shops, where it is found the quickest and most economical method, as it can be done without taking engines or other machinery apart. It is also used in connecting water pipes and gas mains in many cities, and prevents the trouble formerly given by the leakage of high-pressure pipes and mains with riveted joints. In such cases joints welded by this process are not only better but cheaper.

In cutting metals with the oxyacetylene torch, a fine jet of intense heat, similar to that used in welding is used, but under higher pressure. Metal of considerable thickness is quickly cut through with a

narrow and even cut, the process being accompanied by a shower of sparks as the metal is burned through. This method is now applied to the wrecking of steel structures, in scrapping old boilers and tanks, etc.

Acetylene must be used with a suitable burner, whether the flame be required for illuminating purposes, for welding, or cutting metals. The amount of heat generated in its combustion is due to the high percentage of carbon which it contains, requiring a very high temperature to make the carbon particles burn and become luminous. Experienced workmen are essential to success in welding and cutting.

When acetylene passes into a solution of a salt of copper containing ammonia, copper acetylide is formed. This reaction is used by chemists in testing mixtures for the presence of acetylene.

Achaean (ä-kē′an) **League,** a Greek federation, B. C. 280-146. The league originated in Achaea, the most northerly district in the Peloponnesus. It extended sixty-five miles along the Gulf of Corinth. After the death of Alexander the Grecian cities were bones of contention. It was uncertain for a time whether Greece should be under the control of Syria, of Egypt, or of Macedonia. The latter power won. The Greek cities were held in subjection by tyrants in the interest of Macedon, or they were held openly by garrisons. The Grecian campfires seemed wholly dead, when patriotism flamed up in an unexpected corner and lighted Greek history for a final half century. Hitherto Achaea had played a small part in the affairs of Greece. At this juncture, however, an old Achaean confederacy of cities was revived. The cities of Achaea drove out their tyrants, one after another, and drew together. They formed a constitution and were joined by other cities until the Macedonians had no holdings in the peninsula. Athens was liberated from the Macedonian yoke and became an ally, though not a member, of the league. Argos was set free and joined the federation. With the virtual accession of these cities, Greece was free from Macedonian control as far north as Thermopylae. Sparta stood out because the league was unwilling to accord that city the right of leadership.

The Achaean League is mentioned so often as a noted example of early federation, that the main features of the constitution are worthy of examination:

1. The authority was vested in an assembly of citizens. The assembly was not composed of delegates from each city, but of all the citizens who chose to come. It was really a union mass meeting.
2. To prevent the city having the greatest turnout of voters from carrying measures, each city was given one vote. This feature is somewhat akin to the American plan of giving each state two votes in the Senate.
3. The assembly met twice a year for three days at a time.
4. No capital was designated. The assembly met around from place to place. It seemed wise not to centralize in a large city. The same argument has led several American states to designate a small town as a capital.
5. The assembly elected a yearly council of ten, a senate, and a general. The latter might not serve two terms in succession.
6. The cities retained control, each of its local affairs, but turned over to the central government authority to send ambassadors, to make treaties, and declare war. The individual city of the federation gave up all right to negotiate with foreign governments. If Macedon, for instance, sent a messenger to lay a proposal before the citizens of a town, the constitution required that the messenger be referred to the central government.

As time went by, the relations between Sparta and the league became strained. Under the leadership of ambitious men, civil war broke out. Sparta won. The leader of the league invited Macedonia to resume a policy of "protection." Roman legions relieved Macedonia of further responsibility. Greece, as a political organization, was not heard from again for many centuries.

The Achaean constitution developed two weaknesses. Theoretically, it gave every man a chance to take a personal part in legislation. Practically, only the wealthy and their dependents could afford the time and expense required to attend the meetings. The officers served without pay. Democracies then, as now, did not favor large salaries. The consequence was that, although every voter was eligible to office, only the rich could afford to take office. For these reasons the conduct of the league really fell into the hands of the aristocracy.

Achates, a-kā′tez, the faithful squire and companion of Aeneas, the hero of Virgil's *Aeneid,* usually spoken of as *"fidus Achates."* These words have come to be synonymous for a faithful friend. See AENEID.

Achelous, ak-e-lō′us, in Greek mythology, a river god, son of Oceanus and Tethys, and the eldest of their three thousand sons. He fought with Hercules for the favor of Dejanira. Hercules was victorious. When he saw that he was in danger, Achelous changed himself into the form of a snake. Hercules exclaimed, "It was the labor of my infancy to conquer snakes," and clasped the neck of the snake in his strong hands. Achelous was nearly strangled, and quickly assumed the form of a bull. Hercules threw his arms about the bull's neck, and, drawing its head to the ground, overthrew the animal upon the sand. He then grasped the horn of the bull and tore it from its head. This horn was consecrated by the Naiades, and was called Cornucopia and regarded as the symbol of Plenty, but Achelous fought no more with Hercules. See AMALTHEA; HERCULES.

Acheron, ak′e-ron, in classical mythology, one of the five rivers of Hades. The Acheron was tributary to the Cocytus, the Cocytus tributary to the Styx. The name Acheron means "River of Sorrows," or "River of Eternal Woe." In the later legends, Acheron was a son of Helios and Demeter, who gave drink to the Titans during their war with Zeus. For thus aiding the enemy, he was punished by being transformed into an infernal river. The name Acheron is used figuratively to designate the whole lower world. Milton speaks of the river in the second book of *Paradise Lost* as "Sad Acheron of sorrow, black and deep." See HADES; COCYTUS; STYX; CHARON.

Achilles, ȧ-kĭl′lēz, a legendary hero of the expedition against Troy. Homer makes him the hero of the Iliad. Pieced together from various sources, the story of Achilles may be outlined briefly. He was the son of the sea goddess Thetis, who dipped him in the river Styx to render him proof against wounds; but the heel by which she held him was unwet by the water. To prevent his going to war, she sent him disguised as a girl to be brought up among the daughters of a neighboring king. Crafty Ulysses, desiring to enlist the young man for the Trojan War, and suspecting his place of concealment, presented himself as a peddler or traveling merchant with a pack of finery and ornaments, among which he included a shield and spear. The ruse worked well. The handsomest young lady among them all disregarded the articles of feminine attire and turned to the weapons with undisguised admiration. Ulysses gave a cry of alarm, at which the girls shrieked and fled; but Achilles seized shield and spear and put himself in a posture of defense against the supposed approach of an enemy. After this, disguise was no longer possible; he returned home, manned fifty ships with his troops, the Myrmidons, and joined the Greek forces against Troy.

During the siege he became offended at the overbearing conduct of Agamemnon, and withdrew his forces into camp. Later at the intercession of the Greeks, now hard pressed, he loaned his armor to his best friend Patroclus. The well known helmet and crest of Achilles put new courage into the Greeks and daunted the Trojans; but Trojan Paris was so far unfortunate as to kill Patroclus. In his grief Achilles, provided with new armor by Vulcan, put himself at the head of his Myrmidons, and assailed the Trojans on the plain before the city. Killing Hector in a personal combat, he dragged him behind his chariot about the walls of Troy, yet yielded the

dead body to the aged King Priam, who came in person to the Greek camp to beg the sad boon of burying his son. Later, while endeavoring to storm the Scaean gate, an arrow of Paris, directed by Apollo, reached the vulnerable heel of the hero and caused his death.

See TROY; HECTOR.

Achilles' Tendon, the large cord that runs from the muscles of the calf of the leg to the heel. The name arises from a pretty little mythological story to be found in the preceding article. When a person wishes to stand on tiptoe, he shortens the muscles above this tendon, thus drawing up the heel and causing the foot to turn at the ankle and point the toe downward.

Acid, ăs′ĭd, a term given early in the history of chemistry to substances that had a sour taste. The name is derived from the Latin *acetum,* meaning sharp or sour, and was first applied to vinegar to indicate its characteristic property. The meaning of the term was later broadened to include all acid-like substances, and the word *acetic* was made to apply specifically to the acid of vinegar. Also, a general property of acids is their power to change the color of certain dyes, as, for example, litmus. When litmus is brought into a solution containing an acid, the natural blue color is changed to red. But some acids are neither sour nor have the power to change the color of a dye. These as a rule are insoluble in water and belong to the class generally called "weak" acids. The liberation of hydrogen gas when an acid is brought in contact with certain metals, as zinc or magnesium, is another important characteristic. Alongside of this is also the property of combining with alkalies, such as caustic soda or caustic potash. Chemically, an acid may be defined as a compound containing hydrogen which can be replaced by a metal. Hydrogen is the only essential constituent of all acids. Many other substances, like sugar, kerosene, and alcohol, also contain hydrogen; but not one of them shows all of the properties of an acid. Among the common elements forming acids in combination with hydrogen, or with hydrogen and oxygen, are carbon, chlorine, nitrogen, sulphur, phosphorus, silicon, and arsenic. When free from water, acids do not conduct electricity; dissolved in water they conduct, and are decomposed by, the electric current, hydrogen being liberated. A *base* is opposite in properties to an acid, as in general it restores the blue color of litmus and destroys or *neutralizes* the acid. The interaction of an acid with a base forms a distinct compound, called a *salt.*

There is an enormous number of acids, most of which occur ready-formed in the earth or in plants and animals. Many acids are manufactured products. The common acids are hydrochloric acid, sulphuric acid, and nitric acid. The usual forms are solutions of the acids in water. Hydrochloric acid has a pungent, suffocating odor. The commercial article, known also as muriatic acid, is a solution of the gas, hydrogen chloride, in water. When heated, effervescence ensues, a portion of the gas being driven out. The acid occurs among the gases emitted by volcanoes. It is manufactured from common salt. Nitric acid, sometimes called *aqua fortis,* is a fuming liquid having a suffocating odor. It colors animal tissue, notably the skin, yellow. So-called fuming nitric acid has a brown-red color. The acid occurs in very small quantity in air, rain water, and spring water. It is manufactured on a large scale from Chile saltpeter. It is used much in the arts in dyeing, in the etching of metals, and in medicine. Sulphuric acid, also called oil of vitriol, is a heavy, oily, strongly corrosive liquid. It has a strong affinity for water, and when mixed with water a large amount of heat is developed. Organic matter is charred, the acid acquiring a brown color. The acid occurs in small amount in volcanic waters. Enormous quantities are manufactured in England and the United States, each country producing upward of a million tons annually. The method of manufacture is complicated and consists in bringing sulphur dioxide, made by roasting pyrites, and nitric acid in contact with air and steam in large lead chambers. Sulphuric acid is more commonly used than any other acid and for a greater variety of purposes; for example, in refining petroleum, in the

manufacture of fertilizers, in bleaching and dyeing, in the production of coal-tar dyes, and, in conjunction with nitric acid, in the manufacture of nitroglycerin and guncotton. Among the acids occurring chiefly in plants and animals, the so-called organic acids, the best known is acetic acid. This acid is a colorless, clear liquid of strongly acid reaction. Almost all of the acetic acid used in the industrial arts is made by the dry distillation of wood. Large quantities of the weaker acid are made from dilute alcohol. A dilute solution of the acid, known as vinegar, is made by passing the alcohol in a slow stream through a barrel filled with beech shavings. The fermentation of the alcohol to acid is aided by bacteria, so-called "mother-of-vinegar." Citric acid is found in the lemon, currant, cranberry, and other sour fruits; oxalic acid, in *Oxalis* (sheep sorrel); malic acid, in sour fruits, especially apples, and in maple sap; formic acid, in red ants, stinging nettles, pine needles, the honey bee, and honey; butyric acid, in rancid butter, Limburger cheese, and sauerkraut; lactic acid, in sour milk and sauerkraut; palmitic acid, in palm oil; tartaric acid, one of the most widely distributed acids, in grapes. The salts of tartaric acid are called tartrates, chief among which is the well known cream of tartar.

JULIUS HORTVET.

Aconcagua, ä′kon-kä′gwä, the highest peak of the Andes and the highest mountain of the Western Continent, rising 23,080 feet above sea level. It is situated between Aconcagua, a province of Chile, and Mendoza, a department of the Argentine Republic, to which country the mountain belongs. Aconcagua is an extinct volcano. A river of this region bears also the name of Aconcagua.

Aconite, ăk′o-nīt, a plant of the buttercup or crowfoot family. Aconite is commonly known as monkshood and as wolfsbane. There are over twenty species, several of which grow wild in the United States. The flowers of the several species differ in color, being variously violet, yellow, and even white. The common monkshood is blue. One of the five sepals is shaped like a helmet or hood. The common aconite has roots somewhat like those of the horseradish. The leaves and roots yield a deadly poison which destroys the functions of the nervous system and produces palsy of the muscles. It acts powerfully on the heart, ultimately paralyzing it. A tincture of aconite root is made to allay neuralgic pain by producing temporary numbness. The assassins of India dipped their arrows in a preparation made from an aconite found in the Himalayas. See POISON.

Acoustics. See SOUND.

Acre, a unit customarily used in measuring land. The original meaning of the word is a field, pasture, or hunting ground. The historical acre of England was as much ground as a yoke of oxen could plow in a day. In the thirteenth century the acre was fixed by Parliament at 160 square rods or perches. This is still the legal measure in Great Britain and in America. As compared with this statute acre, the Scotch acre contains 1.27, the Irish acre, 1.62, the Welsh, .89, and the hectare of the metric system, 2.47 acres. A section of land, American survey, contains 640 acres and is one mile square.

Acropolis, ȧ-krŏp′o-lĭs, a Greek word signifying the high part of a city, the portion set on a hill. The name grew out of the fact that Greek cities were founded usually on an eminence which was fortified as a citadel. As the city grew, it spread to the lower grounds and was not infrequently surrounded by a strong wall; while the acropolis was made the site of the temple and other public buildings. This was the case of Argos, Thebes, and Corinth. The most noted acropolis is that of Athens. The acropolis of Athens is a table of rock about 260 feet high. It is a spur of Mt. Hymettus with precipitous sides except on the west, where a zigzag road was built, accessible by chariots. The summit was surrounded by massive walls. A number of notable buildings were erected here, the best of which were two temples, the Parthenon and the Erechtheum. The famous open air theaters of Athens were constructed on the sides of this acropolis. See ATHENS: PERICLES: PARTHENON.

Into the center of the entire plain advances

from the direction of Hymettus a group of rocky heights, among them an entirely separate and mighty block which, with the exception of a narrow access from the west, offers on all sides vertically precipitous walls, surmounted by a broad level sufficiently roomy to afford space for the sanctuaries of the national gods and the habitations of the national rulers. It seems as if nature had designedly placed this rock in this position as the ruling castle and the center of the national history. This is the Acropolis of Athens.—E. Curtius, *History of Greece.*

Acrostic, a composition so arranged that the initial letters of the lines taken in order spell out some name, title, or motto, or follow the order of the alphabet. An acrostic may be written in such a way that the final letters or, indeed, any letters, have a similar effect. Edgar A. Poe is credited with an acrostic so framed that the first letter of the first line, the second letter of the second line, the third letter of the third line, etc., formed the name Francis Sargent Osgood. Addison (see *Spectator* No. 60), considered the maker of an acrostic a mere blockhead, saying, "I have seen some of them where the verses have not only been edged by a name at every extremity, but have had the same name running down like a seam through the middle of the poem."

One of the most famous acrostics in history was formed in the time of Charles II. Some wit noted that the names of the ministers, Clifford, Ashley, Buckingham, Arlington, and Lauderdale, could be arranged in such a way that their initials formed the word cabal, a term signifying low political intrigue. The word cabal has ever since had additional significance. It is now taken to mean a junta or clique of persons organized for some questionable purpose.

Psalm cxix is an acrostic. In the original Hebrew the initial letters of the divisions form the alphabet. The juvenile jingle, "A apple pie; B baked it; C cut it," etc., is a familiar nursery acrostic.

Act, in the presentation of drama, one of the main divisions of a play, in which a definite portion of the action is completed. The divisions of drama into act and scene may mark a change of time or place. They give relief to both actors and audience from the strain of a long play, and also afford opportunity for change of costume and scenery. The unities of the Greek drama made separation into acts unnecessary. The Roman theater first adopted the division of a play into acts, and made five the regular number. Horace mentions this as a fixed rule, and it was obeyed by all dramatists of the Renaissance. Shakespeare, who paid little attention to any of the accepted rules of dramatic art, invariably divides his dramas into five acts. In light comedy, the rule is no longer regarded as essential; but in tragedy, where the action is weighty, there seems to be a real reason for the five acts. In every great action, there are naturally three parts, the introduction, the climax, and the conclusion. By presenting the introduction, or causes leading to the climax, in two acts instead of one, the characters are better developed, the interest is deepened, and the climax, being in a measure anticipated, is more impressive. So two acts leading from the climax to the final catastrophe allow the mind of the spectator to grasp more fully the sadness and horror of the situation, and thus those emotions which real tragedy should arouse are more deeply stirred. See DRAMA; TRAGEDY; COMEDY; SCENE.

Act of God, a legal expression used to cover natural and accidental disasters beyond the control of man. Cyclones, hailstorms, strokes of lightning, and storms at sea are acts of God in a legal sense. Railroads, steamships and other carriers customarily insert a clause in their bills of lading to the effect that they shall not be held responsible for any loss or damage to goods arising from an act of God. Courts hold, however, that the loss must be due immediately to the act of God in order that a carrier may escape responsibility. If, for instance, lightning should strike a stock car and kill several fine steers, the railway company could not be held for the value of the steers; but if a stroke of lightning should set fire to a bridge, and a stock train should later break through, the company could be required to pay losses on the ground that the accident might have been prevented by human forethought and caution.

Actium, ăk′shĭ-ŭm, a promontory made famous by a naval battle, 31 B. C., in which Octavius, afterward called Augustus Caesar, won the victory over Antony and Cleopatra, and became master of the Roman Empire. The promontory in modern times bears the name of La Punta. It is situated in the northern part of Acarnania, a province of Greece. Augustus enlarged the temple of Apollo which was located near by, and in honor of his victory instituted there the quinquennial games which were called "Actia" or "Ludi Actiaca."

Actor or **Actress,** in the drama, one who represents a character, or acts a part in a play. The first actor of the early Greek drama was a minstrel or rhapsode, who recited epic poems between the songs of the chorus. Soon two actors instead of one appeared; then three, and gradually the number increased. The actors were invariably men or boys. The first actress to appear on any stage performed in France and England during the seventeenth century.

The actors of the first miracle plays were priests who used this method to teach and preach to the people. As these plays increased in popularity, the laity became actors. In their prime, the miracle plays were undoubtedly presented by skillful actors. In York, in the year 1476, four of the best players were appointed to examine would-be actors and select such as should take part. Much difficulty was caused by the great number of applicants. The following ordinance was issued: "All such as they shall find sufficient in person and cunning, to the honor of the city and worship of the said crafts, for to admit and able; and all other insufficient persons, either in cunning, voice, or person, to discharge, ammove and avoid."

During the Elizabethan age the actors of dramas were usually young men of good family, frequently students from some university. The profession of acting brought them money and notoriety. It was doubtless in many instances regarded as good sport, bringing them into pleasant company. However, actors were not held in good repute. They were considered, and probably deserved to be considered, very wild, and were classed usually with the dissolute.

Our great actors and actresses are frequently looked upon as marvelously gifted by nature, and too little credit is given them for the months and years of laborious toil which have been spent in mastering the art. The actor must study each new part until he so far becomes the character he would represent as to be able to interpret his own conception to his audience by speech and gesture. The laws of gesture, or "bodily eloquence," as it has been called, control the actor's bearing, walk, expression, and movements of face and limbs. The laws of rhetoric must regulate pronunciation, modulation, accent, and rhythm. Through all, and in all, must be that human sympathy and self-forgetfulness which enables him really to live the part he would present.

Among actors and actresses who have won a world wide reputation may be mentioned John Philip Kemble, Charles Kemble, Mrs. Siddons, Edwin Booth, Sarah Bernhardt, Joseph Jefferson, Henry Irving, Mary Anderson-Navarro, Ellen Terry, William Macready, and David Garrick, Sir Johnston Forbes-Robertson, Elnora Duse, William H. Gillette, Sir Herbert Beerbohm Tree, Tommaso Salvini, Robert Mantell, Edmund Kean, Benoit Constant Coquelin and Richard Mansfield.

Adam, in the Scriptural account of the creation, is the first man, whom "the Lord formed of the dust of the ground." The word Adam in the Hebrew is an appellative noun and means the first man. Its etymology is uncertain but it is believed to be connected with a root which signifies "ruddy" or "red." In the Bible story, Adam gives "names to all cattle, and to the fowl of the air, and to every beast of the field," and is given dominion over all these creatures. But because he is alone and has no helpmeet, the Lord God causes a deep sleep to fall upon him and takes one of his ribs, and from it makes a woman,—Eve. The account of the life of the first couple in the beautiful garden where God himself "walked in the cool of the day," and where grew the tree

of life, and the tree of the knowledge of good and evil, is one of the most fascinating in all literature. Their peaceful life is interrupted by the temptations of the wily serpent; Eve yields to him and again Adam yields to her, whence follow shame, discovery, punishment, the curse, the banishment from the garden and "the flaming sword which turned every way to keep the way of the tree of life." The story of his sons Cain and Abel is well known. Another son, Seth, is mentioned in the fifth chapter of Genesis as having been born when Adam was 130 years of age. Adam lived to be 930 years old and it is stated that at the time of his death his descendants numbered 40,000 souls. See EDEN.

Adam Bede, the earliest of George Eliot's novels. It was published in 1859. It is her most popular tale. The hero, Adam Bede, is a young carpenter. He is a striking example of the nobility of a commonplace nature in ordinary surroundings. The character is said to be in part a portrait of Mr. Evans, George Eliot's father. Other interesting characters are Hetty Sorrel, Dinah Moore, the woman preacher, and Mrs. Poyser. The picture of Adam singing at his work presents a fine type of the young English workman.

Such a voice could only come from a broad chest, and the broad chest belonged to a large-boned, muscular man nearly six feet high, with a back so flat and a head so well poised that, when he drew himself up to take a more distant survey of his work, he had the air of a soldier standing at ease. The sleeve rolled up above the elbow showed an arm that was likely to win the prize for feats of strength; yet the long supple hand, with its broad finger-tips, looked ready for works of skill. In his tall stalwartness Adam Bede was a Saxon, and justified his name; but the jet-black hair, made the more noticeable by its contrast with the light paper cap, and the keen glance of the dark eyes that shone from under strongly marked, prominent and mobile eyebrows, indicated a mixture of Celtic blood. The face was large and roughly hewn, and when in repose had no other beauty than such as belongs to an expression of goodhumored, honest intelligence.

Adam is not a man of many words, but he lets fall some bits of wisdom:

"I hate to see a man's arms drop down as if he was shot, before the clock's fairly struck, just as if he'd never a bit o' pride and delight in 's work. The very grindstone 'ull go on turning a bit after you loose it."

"I wouldn't give a penny for a man as 'ud drive a nail in slack because he didn't get extra pay for it."

"I've seen pretty clear ever since I could cast up a sum, as you can never do what's wrong without breeding sin and trouble more than you can ever see."

"A good solid bit o' work lasts: if it's only laying a floor down, somebody's the better for it being done well, besides the man as does it."

Adam's Apple, a name applied in sport to the enlarged gristly framework in the throat of a man. It is known to physiologists as the larynx. It is said that when Eve gave Adam the forbidden apple the core lodged in his throat. See LARYNX.

Adams, Charles Francis (1807-1886), an American statesman. He was the son of John Quincy Adams, the sixth president of the United States, and was born at Boston. At the age of two he was taken to St. Petersburg where the family resided several years, the father being minister to Russia. Here Charles learned the Russian, German, and French languages. Later, when the elder Adams was appointed minister to England, the boy was placed in an English boarding school. On returning to America he attended a Boston Latin School, graduated from Harvard, and was admitted to the bar in 1828, having studied law in the office of Daniel Webster. In 1831 Adams became a Whig member of the Massachusetts legislature; in 1848 was a candidate for the vice presidency, and was member of Congress from Massachusetts 1859-61. He was minister to England for seven years, and was arbitrator at the Geneva tribunal 1871-72. Adams was the author of *The Life and Works of John Adams,* and edited the *Diary of John Quincy Adams.*

Adams, Charles Kendall (1835-1902), an American educator and writer. He was a native of Vermont. When quite young he moved to Iowa, and later entered the University of Michigan, from which institution he was graduated in 1861. Two years later he became assistant professor of history at his alma mater, and was shortly after elected to a full professorship. In 1885 he was made president of Cornell University and in 1892 president of the University of Wisconsin, which

position he filled until 1901. He was the author of many pamphlets and articles on educational subjects, and of the books, *Democracy and Monarchy in France,* and *Manual of Historical Literature.*

Adams, John (1735-1826), the second president of the United States. He was born at Braintree (now Quincy), Massachusetts, October 19, 1735. He graduated from Harvard College in 1755, and was admitted to the bar three years later. In 1774, he represented Massachusetts in the first Continental Congress. The following quotation from a letter written by him at this time gave the keynote of Webster's supposed speech of John Adams: "The die is now cast; I have passed the Rubicon. Sink or swim, live or die, survive or perish with my country, is my unalterable determination." In May, 1776, he moved the resolution that the colony "should assume the duty of self-government." In June he seconded Richard Henry Lee's resolution that the United States "are, and of right, ought to be, free and independent." Mr. Adams was one of a committee of five appointed to draw up the Declaration of Independence. He was Minister to France, 1778-1779. With Franklin and Jay he negotiated the treaty of peace with Great Britain. He was minister to England, 1785-1788. Schouler, the historian, calls Adams a "burly, round-faced, bald-headed, irascible man." During Washington's term as president Adams served as vice-president. He was chosen by the Federalists to succeed Washington, but failed of reëlection. Mr. Adams then retired from public life to a large estate at Quincy, Massachusetts, where he interested himself in agriculture. He died July 4, 1826, on the same day as Thomas Jefferson.

Abigail Adams, the wife of John Adams, was one of the famous women of the White House. During her residence in Paris with her husband she wrote notes on French society that gave no little offense to the French people.

Adams, John Quincy (1767-1848), the sixth president of the United States. He was a son of President John Adams and was also a graduate of Harvard, where he received his degree in 1788. He was admitted to the bar 1791, and in 1794 was appointed minister to Holland. In 1797, he received a similar appointment to Berlin. From 1803-1808, he served as United States senator from Massachusetts. In 1809, he became minister to Russia, and in 1815, to England. He became secretary of state under Monroe in 1817. In 1824 Mr. Adams was elected president and served one term. He was defeated for reëlection by Andrew Jackson. In 1830 he was sent to Congress, a position which he retained for seventeen years. He was the first ex-president to take a seat in the House of Representatives.

Mr. Adams was a man of strong feelings and of a constructive mind. As secretary of state he negotiated the purchase of Florida from Spain for $5,000,000. Russia was preparing to assert claims to a large portion of the territory adjacent to Alaska, thus endangering our title to Oregon. Secretary Adams notified the Russian minister that "we should contest the right of Russia to any territorial establishment on this continent, and that we should assume distinctly the principle that the American continents are no longer subjects for any new European colonial establishments." This declaration was the germ of the Monroe Doctrine. As president, Mr. Adams favored a vigorous policy of internal improvement. Four million dollars of national money was expended on canals and roads. The Cumberland Road, the great artery for westward migration, was extended toward St. Louis. During his administration, the bill, dubbed the Tariff of Abomination, was enacted.

Mr. Adams' return to public life after his defeat for reëlection to the presidency was due to local sentiment. He was in no sense a party leader, and was out of sympathy with American politics. He was elected representative by anti-masonic sentiment and entered the House as an independent, an attitude which he maintained consistently to the end. Adams was an ardent supporter of the anti-slavery cause. He was one of seven congressmen to vote against the Pinckney resolution which declared that Congress had no authority to

interfere with or restrict slavery where established. He fought nine years to abolish a congressional rule popularly known as the "gag-law," which forbade the reception of further petitions for the abolition or restriction of slavery. In this he was a champion of the right of petition, and won the name of the "Old Man Eloquent."

Mr. Adams died literally "in the harness." He fell on the floor of the House with a stroke of apoplexy, surviving but two days. He was succeeded in Congress by Horace Mann.

Adams, Maude (1872-), an American actress. She was born at Salt Lake City where her mother was leading woman in a stock company. As a little girl Maude appeared on the stage in child parts. At the age of sixteen she joined the E. H. Sothern Company of New York, and was a member, later, of Charles Frohman's company. She supported John Drew for several years and has starred in a number of plays. Her most popular parts are Babbie in *The Little Minister,* and *Peter Pan.* She has a summer home at Ronkonkoma, Long Island.

Adams, Samuel (1722-1803), a native of Boston. Samuel Adams was a second cousin of John Adams. He was graduated at Harvard in 1740. Adams became a merchant, but attended to the people's business to the neglect of his own. Sam Adams, as he was familiarly called, took so prominent and determined a part in opposing the Stamp Act, in organizing the Boston Tea Party, in addressing public meetings, and in organizing opposition to the British generally, that he had the distinguished honor of being one of two men exempted by name from a general pardon offered by the British government in 1775. Adams was a member of the first Continental Congress, 1774; he signed the Declaration of Independence, 1776. He was a member of the state senate and a member of the state convention which ratified the Federal Constitution in 1778. In later politics he was a Jeffersonian, as opposed to the Federalists, thus becoming a political opponent of John Adams. He was elected governor of Massachusetts, 1794, and was reëlected twice. Adams was an incorruptible patriot. Among the Revolutionary figures of Boston, Sam Adams is the popular hero. Well educated and well connected, he was decidedly a man of the people. John Adams, with whom he was not always in accord, credited him with merit and talent, saying of his writings that they contained "specimens of a nervous simplicity of reasoning and eloquence that have never been rivaled in America."

Sam Adams understood the value of the town meeting and impromptu discussion. He knew how to further his purpose by calling the citizens together and getting them to carry out his plans, thinking they were doing their own will. He was a shrewd and beneficent political "boss." For instance, as early as 1772, at a town meeting held in Faneuil Hall, he moved the appointment of a "Committee of Correspondence." This committee had no legal or official existence. The British authorities could get no hold on it, but it had the public behind it. The idea took all over New England. It caught in Virginia, and led to the Intercolonial Committee of Correspondence. In this way Adams may be said to have engineered and made possible the American Revolution.

See REVERE; CAUCUS.

Adams, William Taylor (1822-1897), an American editor and author, better known by his pseudonym of Oliver Optic. He was a teacher for many years in Boston. He wrote many stories of travel and adventure for young people. *Young American Abroad, Starry Flag Series, Riverdale Series,* and *Onward and Upward* are among them. He founded and edited *Oliver Optic's Magazine.*

Adamson Law, a law enacted by Congress in September, 1916, to prevent a threatened strike by the four great railroad brotherhoods to secure the eight hour day and several minor concessions, chiefly with regard to wages. The controversy between the railroads and the brotherhoods was carried on for months, and culminated in a demand by American business associations that the dispute be settled by arbitration.

Thereupon, President Wilson made an arbitration proposal to the brotherhoods,

and to the railway executives. The latter found that the President's plan was not acceptable. A deadlock ensued, and on August 27 the brotherhoods issued a secret strike order, effective September 4 (Labor Day).

The President then went before Congress and pled for the passage of a law that would serve to remove what had become a menace to the industrial life of the nation. Conferences between House and Senate administration leaders revealed the fact that not all the legislation requested by the President could be secured. The brotherhoods, through their spokesmen, let it be known that if a bill satisfactory to them could be passed by September 2 the strike order would be rescinded, but not otherwise. Congress then passed what is known as the Adamson Law, which provides, in part—

Sec. 1. That, beginning Jan. 1, 1917, eight hours shall, in contracts for labor and service, be deemed a day's work and the measure or standard of a day's work for the purpose of reckoning the compensation for services of all employes who are now or may hereafter be employed by any common carrier by railroad, except railroads independently owned and operated not exceeding 100 miles in length, electric street railroads and electric interurban railroads, which are subject to the provisions of the act of Feb. 4, 1887, entitled 'An act to regulate commerce,' as amended, and who are now or may hereafter be actually engaged in any capacity in the operation of trains used for the transportation of persons or property on railroads, except railroads independently owned and operated not exceeding 100 miles in length, electric street railroads and electric interurban railroads, from any state or territory of the United States or the District of Columbia to any other state or territory of the United States or the District of Columbia, or from one place in a territory to another place in the same territory, or from any place in the United States to an adjacent foreign country, or from any place in the United States through a foreign country to any other place in the United States: Provided, That the above exceptions shall not apply to railroads though less than 100 miles in length whose principal business is leasing or furnishing terminal or transfer facilities to other railroads, or are themselves engaged in transfers of freight between railroads or between railroads and industrial plants.

Sec. 2. That the President shall appoint a commission of three, which shall observe the operation and effect of the institution of the eight hour standard work day as above defined and the facts and conditions affecting the relations between such common carriers and employes during a period of not less than six months nor more than nine months, in the discretion of the commission, and within thirty days thereafter such commission shall report its findings to the President and Congress.

Sec. 3. That pending the report of the commission herein provided for and for a period of thirty days thereafter the compensation of railway employes subject to this act for a standard eight hour workday shall not be reduced below the present standard day's wage, and for all necessary time in excess of eight hours such employes shall be paid at the rate not less than the pro rata rate for such standard eight hour workday.

Sec. 4. That any person violating any provision of this act shall be guilty of a misdemeanor and upon conviction shall be fined not less than $100 and not more than $1,000, or imprisoned not to exceed one year, or both.

The bill was signed by President Wilson on Sunday, Sept. 3, and also on Tuesday, Sept. 5, in case the Sunday signature should prove to be illegal.

Addams, Jane, an American settlement worker. Born at Cedarville, Illinois, September 6, 1860. Graduated at Rockford College in 1881. While pursuing postgraduate studies in England, Miss Addams became interested in the workings of Toynbee Hall, a university settlement in the Whitechapel district of East London. In 1889 she secured the coöperation of wealthy people and established Hull House, a similar settlement in a crowded portion of Chicago. See HULL HOUSE.

She soon acquired an enviable reputation

for executive ability, and in a short time she attained to a position of leadership in the social settlement movement. The problems of city administration interested her, and for a period of three years she served as inspector of streets and alleys in the poor district about Hull House. This brought Miss Addams into the closest contact with many and varied people; and her ability and insight enabled her to use each separate experience while in this work to extend and intensify the activities of social settlement.

Miss Addams has served on the Chicago Board of Education, and is well known as a magazine writer, lecturer and author. In 1912 she took a prominent part in the organization of the Progressive Party and was vice-president of the National Women's Suffrage Association. In 1915 she presided at the International Peace Conference of Women at the Hague.

After the entrance of the United States into the World War Miss Addams became a vigorously outspoken pacifist. Her efforts to secure and perpetuate peace were not based upon friendliness toward the enemy, but upon the conviction that war is barbaric and unnecessary. In 1919 she attended a women's peace conference at Zurich, and another at Vienna in 1921. And after her return to the United States, Miss Addams wrote several articles on social and economic conditions as she saw them in Europe.

Her published works include *Democracy and Social Ethics, Newer Ideals of Peace, Twenty Years at Hull House, The Spirit of Youth and the City Streets, A New Conscience and an Ancient Evil,* and *The Long Road of Women's Memory.* She has also written articles for magazines.

Adder. See VIPER.

Addison, Joseph, an eminent man of letters. Born at Milston, England, 1672. He was educated at the Charterhouse, London, and in the University of Oxford, where he distinguished himself by application and by skill in writing Latin verses. The elder Addison was a distinguished clergyman. He intended his son for the church, but influential friends persuaded the young man to prepare for public life. At the age of twenty-seven they secured him an appointment, with the privilege of travel for a year to two, on salary. He traveled chiefly in Italy and France, living for a time in the brilliant society of Paris and Versailles. A change in the English government cut this life short. He returned to England. A poem on the victory of Blenheim brought him to the notice of the Whigs, from whom he received several important appointments or secretaryships. He married the widowed Countess of Warwick, a lady of social standing, one who was a help so far as rising in the world was concerned. But Addison seemed to lack executive ability. In drawing up state papers, he is said to have written rather as a poet or an essayist than as one transacting public business of importance. Though one of the most famous men of his day, and popular with all parties, he proved so unsuited for public place that he was forced to retire. He was granted a pension, however, of $7,500 a year.

Addison's wife lived in style in the famous Holland House, but it was never a congenial home for Addison. His great delight was to spend a few hours with friends at a club house, where they smoked, drank claret, told stories, and discussed politics or literature. Addison died June 17, 1719, and was buried at dead of night in Westminster Abbey. His death was universally regretted. The notable men of the day gathered in sad procession to follow his remains through the passages of that wonderful abbey in whose gloomy recesses the poet delighted to walk, pondering on the uncertainty of life.

Addison is known best as a writer of essays. He contributed to the small periodical sheets known as the *Spectator,* the *Tatler,* the *Guardian,* and the *Freeholder.* Addison was himself a genial, prosperous, generous man, with an intense desire to see everybody happy and well-doing. His essays were short and witty attacks on the vices and foibles of the day. More than that, they aimed to substitute, in a quiet, attractive fashion, positive virtues for the faults and follies exposed. In one of the *Spectator* papers, Addison himself says,

"The great and only end of these speculations is to banish vice and ignorance out of the territories of Great Britain." His essays were read and discussed in every drawing room in the United Kingdom. His pictures of licentiousness, debauchery, drunkenness, lazy habits, coquetry, irreligion, thoughtlessness, gross eating, jealousy, vanity, and love of loud display, were so vivid, and yet so humorous, that they turned the laugh of fashionable society against exhibitions of this sort. His descriptions of the corresponding virtues were so attractive, so sincere, and appealed so strongly to the better nature of people, that he is said to have done much to make quiet tones, modesty, becoming attire, gentle ways, truthfulness, chastity, and moderate living fashionable. His service to literature and to society was the uniting of the stern virtues of the Puritans with the pleasures of the Cavalier. Addison taught that it is not necessary to be wicked in order to have a good time; that well-doing and happiness go hand in hand. In his dissection of a beau's brain, for instance, he found that "the ogling muscles were very much worn and decayed with use; whereas, on the contrary, the elevator, or the muscle which turns the eye toward heaven, did not appear to have been used at all." Speaking of young ladies, he described his method of training "a lady to quit her fan gracefully when she throws it aside in order to take up a pack of cards, adjust a curl of hair, replace a falling pin, or apply herself to any other matter of importance. This part of the exercise . . . may be learned in two days' time." Such sentences were talked over and laughed over in the fashionable circles of London until the "mashers" and "flirts" of society were fairly laughed out of court. Addison's bright sayings were at everyone's tongue's end. The fear of ridicule did much to bring about a desired change of manners. One of his noblest essays is the *Vision of Mirza,* in which he likens the human race to a procession passing along an elevated road carried across a deep gulf by means of arches full of holes, through which, sooner or later, all travelers fall.

Addison's prose is one of the priceless heritages of literature. Much of his poetry will not be remembered. A few hymns, however, revealing his contemplative, intense, pious nature are among the finest in the English or any other language. It is small wonder that the writer of the following lines could not bring himself to the successful preparation of foreign correspondence, designed to say much and mean little:

Soon as the evening shades prevail,
The moon takes up the wondrous tale,
And, nightly, to the list'ning earth,
Repeats the story of her birth;
While all the stars that round her burn,
And all the planets in their turn,
Confirm the tidings as they roll,
And spread the truth from pole to pole.

What though, in solemn silence, all
Move round the dark terrestrial ball?
What though no real voice, nor sound,
Amid their radiant orbs be found?
In Reason's ear they all rejoice,
And utter forth a glorious voice;
Forever singing as they shine,
"The hand that made us is divine."

Whoever wishes to attain an English style familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison.—Dr. Samuel Johnson.

A life prosperous and beautiful—a calm death—an immense fame and affection afterwards for his happy and spotless name.—Thackeray.

Ade, George (1866-), an American journalist and author. His witty *Fables in Slang* is the best known of his writings. He is also the author of *Artie,* of a comic opera, *The Sultan of Sulu,* and of several successful comedies, among them, *Peggy from Paris, The College Widow,* and *The Fair Co-Ed, Ade's Fables,* and *The Slim Princess.* Some later plays are: *The Old Town, Mrs. Peckham's Carouse,* and *Nettie.*

Adelaide, ăd′e-lād, the capital city of South Australia. It is situated on the Torrens River, seven miles southeast of Port Adelaide. It is the seat of the University of Adelaide and has fine government buildings and Parliament houses, beside an extensive botanical garden. The South Australian Institute is situated here. In 1921 the population, including suburbs, was 255,318.

Aden, ä′den, an important seaport on the southern coast of Arabia. The city occupies the crater of an extinct volcano. Volcanic bluffs, the lip of the old crater, encircle the city, rising to a height of 2,000 feet. Aden was a depot of trade in Roman times. It is now the seat of government, not only for British territory in Arabia, but for British Somaliland, a strip of seacoast wrested from Abyssinia. Recent fortresses have rendered the port one of the strongest fortifications in the world, almost ranking with Gibraltar. Aden is the center of the Arabian caravan trade. On an average 767 loaded camels swing into the town daily. Each is loaded with from 600 to 900 pounds of coffee, fodder, grain, fruits, vegetables, wood, charcoal, and water. There are no wagons, no horses, only camels, many from a distance of seven hundred miles. The trade of Abyssinia centers at Aden. Aden exports coffee, gum arabic, tobacco, hides, and other local products. The opening of the Suez Canal made Aden a coaling station on the way to India. Aden is a variation of the word Eden, meaning Paradise, the name being given on account of its fine climate, perpetual sunshine, and pleasant sea breezes. The population of the city and immediate vicinity is about 45,000. When it is 12 o'clock at noon in the Mississippi Valley, it is 9 P. M. at Aden.

See ARABIA; SUEZ CANAL.

Ad′enoids, a term in common use to designate the overgrowth of adenoid tissue in the upper throat or nasopharyngeal vault, as it is called properly. Adenoid or adenose means literally "in the form of a gland," and adenoid tissue is net-like tissue, the spaces of which are filled with cells resembling white blood corpuscles. Such tissue is found in the lymphatic glands, in the intestinal mucous membrane and elsewhere. The overgrowth of this tissue between nose and pharynx induces many other troubles. It occurs usually in young children, the obstructed air passages cutting off the supply of oxygen. The child breathes through the mouth—although mouth breathing is regarded sometimes as a cause of adenoids as well as a result—enunciation becomes difficult, and deafness is of common occurrence. Catarrh is caused frequently by adenoids, and enlarged tonsils are a common accompaniment. Any and all of the evils attendant upon a scanty supply of oxygen may result until the child becomes an invalid or is stunted in body and mind. Adenoids are removed readily by a physician, the operation being a simple one, from which a child, otherwise normal, recovers in a day or two.

Adhesion. See COHESION.

Adiron′dacks, a group of mountains in northeastern New York, west of Lake Champlain. This mountain system is largely of granite formation and rises from an extensive plateau. Its highest peaks are Mount Marcy, which has an altitude of 5,344 feet, Mount MacIntyre and Skylight. The mountains are covered with valuable timber which is readily conveyed to the mills by means of two rivers, the Hudson, flowing south, and the Richelieu, flowing north. The output of iron ore from New York State—in 1904 over 700,000 tons—is largely a product of the Adirondack region. The climate of this district is in winter very severe, but is considered advantageous to those suffering from pulmonary troubles, and several sanitariums have been erected among these mountains. The state reserves a forest park of over 2,000,000 acres with a force of men to act as guides, to guard against fires, and to enforce game laws. The scenery is picturesque and beautiful, lakes abound, and there is no more popular resort for hunters, campers, and those who love nature and a free, wild life.

Adjutant, a large bird of the stork family, so called from its erect, military bearing. It is a familiar bird about the villages of India. It has a tremendous capacity for eating and acts as a public scavenger. It can swallow a cat with ease. It is about five feet high and spreads its wings about fourteen feet. The white "marabou" feathers of the milliner's store are plucked from the underside of its wings.

Adler, Felix (1851-), a Hebrew author and lecturer of the United States. He was born at Alzey, Germany, but the

family came to the United States in 1857. He was educated at Columbia College, from which he graduated in 1870, studying later in Berlin and Heidelberg. He was professor of Hebrew and Oriental literature at Cornell, 1874-1876. He then established in New York a religious organization, called the Society of Ethical Culture. Before this Society he delivered regular Sunday lectures. In 1877 Adler published *Creeds and Deeds,* a series of discourses setting forth his views. He has since published *The Ethics of the Political Situation, The Moral Instruction of Children, Life and Destiny, Essentials of Spirituality,* and other works. Since 1902 he has filled the chair of political and social ethics at Columbia.

Admetus. See ALCESTIS.

Adobe, ȧ-dō′ba, from a Spanish word meaning to daub or plaster. Adobes are sun-dried bricks made of clay, mixed sometimes with straw to give strength. The bricks made by the children of Israel under Egyptian taskmasters were adobe. The earliest buildings in the valley of the Euphrates were of adobe, made of the sticky clay found in that region. The walls of the Alhambra are built of red adobe. The natives of Arizona and New Mexico construct their dwellings of adobe. When a new house is needed or an additional room, the women folks are set at work carrying water, and the neighbors are invited in. The clay of the front dooryard is mixed with water until it has the consistency of putty; it is then molded into bricks, about $18 \times 9 \times 4$ inches in size. These are piled up in the sun to dry, and when thoroughly hardened, are built into walls. The roof is composed usually of poles and brush, covered with grass and earth, or turf, if it may be had. Adobe dwellings are cool and dry, two essentials in a hot climate. Adobe is suitable for use only in a practically rainless region. Heavy, continued rains would convert an adobe cottage into streaming rivulets of mud. Where the average rainfall is not great, structures built of adobe last indefinitely with reasonable repair; the greatest amount of disintegration being at the base of the walls during seasons of rain, although prolonged sand storms erode the surfaces. For the sake of appearance, as well as to aid in protecting it against weathering, adobe masonry is often plastered, the Indian women using their hands as trowels. The interior walls, and sometimes also the borders of the windows and doors, are whitewashed with gypsum. Adobe soil covers many thousand square miles of the arid west. When watered, it is fertile. It is a limy clay loam of a gray-brown color, fine as flour and free from grit. In places adobe soil, thousands of feet deep, is considered a wind deposit. Extensive areas are covered with fine volcanic dust which shades off into coarse soil like crushed coke. See BRICK; CLIFF DWELLERS; PUEBLO; ALAMO.

Adolescence, ăd′o-lĕs′sens, a term applied to the period of transition from childhood to adult life, extending in a general way from twelve to twenty-one in females and from fourteen to twenty-five in males. Development throughout this period varies considerably with the individual, but there are certain well-marked characteristics usually present, the best known being that of sex unfoldment and differentiation, evidenced for example by the changing of the voice and the beginning of the growth of a beard in the boy.

More valuable perhaps, but no less important than the physical, are the mental and emotional traits of this period. It marks the beginning of individuality and usually fixes the habits and ideals of life. Like any transitional period, it is marked by unrest and instability, and is often not properly appreciated by parents and teachers as a natural condition with which to deal as best they may. It is but a step in evolution and not revolution, as many are wont to suppose. The great problem of one engaged in the guidance of youth is the recognition of his new impulses, interests and emotions, so as consistently to direct them into proper channels. There is no more comprehensive treatise on this phase of human development than that most admirable work by G. Stanley Hall, entitled, *Adolescence,* with which no true educator can afford to be unacquainted.

Adonais, ăd-o-nā′ĭs, a poem by Percy

Bysshe Shelley. The poem is an elegy on the death of Keats. The name Adonais was coined by Shelley, perhaps in imitation of an elegy on the death of Adonis by the classic poet Bion, a contemporary of Theocritus. This poem begins "I mourn for Adonis, beauteous Adonis is dead." The first line of Shelley's elegy is:

I weep for Adonais—he is dead!

This poem is regarded by critics as one of the three great English elegies, the others being Milton's *Lycidas,* and Tennyson's *In Memoriam.* While *Lycidas* surpasses it in perfection of execution, and *In Memoriam* is more profound, *Adonais* is considered by many the most beautiful. Shelley himself said of it, "The *Adonais,* in spite of its mysticism, is the least imperfect of my compositions."

QUOTATIONS.

Alas! that all we loved of him should be,
But for our grief, as if it had not been,
And grief itself be mortal! Woe is me!
Whence are we, and why are we? of what scene
The actors or spectators? Great and mean
Meet massed in death, who lends what life must borrow.

As long as skies are blue, and fields are green,
Evening must usher night, night urge the morrow,
Month follow month with woe, and year wake year to sorrow.

And keep thy heart light, lest it make thee sink,
When hope has kindled hope, and lured thee to the brink.

Peace, peace! he is not dead, he doth not sleep—
He hath awakened from the dream of life.

Life, like a dome of many-colored glass,
Stains the white radiance of eternity.

See SHELLEY.

Adonis, a-dō′nis, in Greek mythology, a beautiful boy beloved by Venus (Aphrodite). He was slain by a wild boar. Venus sprinkled nectar upon his blood, and therefrom sprang the anemone, or wind flower. At the request of Venus, Zeus decreed that Adonis should spend half the year in the upper and half in the lower world. His death was celebrated by an autumnal, his resurrection by a spring, festival. Adonis is an oriental deity of nature, a type of the decay of nature in autumn and its revival in spring. "Beautiful as Adonis," is a common expression.

Adoption, the act of taking a stranger into one's family as a son or a daughter. In England, where the inheritance of real estate is guarded very carefully, adoptions are not recognized by law, but in the United States most states provide by a statute for the adoption of children. A child thus adopted becomes, to all intents and purposes, a member of the family, and is an heir-at-law as though it were the actual child of the family.

Adrian, or Hadrian, the name of six popes, two of whom, Adrian IV, and Adrian VI are of considerable interest.

Adrian IV was the only Englishman who ever occupied the papal chair. His English name was Nicholas Brakspere. He became a servant in the French monastery of St. Rufus, later becoming a regular monk, then prior, and finally, abbot. In 1146, he was made cardinal bishop of Albano by Eugenius III. On the death of Anastasius IV in 1154, he was elected Pope. It was he who gave Ireland to Henry II of England. He died in 1159.

Adrian VI was elected Pope in 1522, and set about correcting abuses in the Church. He died in 1523, with most of his ambitious plans unrealized.

Adrianople, ăd-rĭ-an-ō′pl, an important commercial city of former European Turkey. It was the capital of the vilayet, or province of Adrianople, situated on the Maritza River, 137 miles northwest of Constantinople. The most splendid Moslem temple extant—the mosque of the Sultan Selim—is in this city. Adrianople was founded by the Emperor Hadrian, and was the capital of the Ottoman empire for nearly a hundred years, 1361-1453. Population about 80,000.

Adriatic (ăd-re-ăt′ĭk) **Sea,** or **Gulf of Venice,** an arm of the Mediterranean, between Italy and Greece. It is 500 miles in length. The name is derived from the city of Adria, once a native port, but now fifteen miles inland. The coasts of the Adriatic near the Po are low, swampy, fertile, and populous. Elsewhere the Italian, Turkish, and Grecian coasts are precipitous and rocky. They are provided with few good harbors, compared with the coasts of the Aegean. Before the discovery of a route around the Cape of Good Hope, the Adriatic and its port, Venice, formed

the chief pathway of the world's sea commerce. See VENICE; MEDITERRANEAN SEA.

Adulteration, a term applied to the use of foreign or cheaper ingredients in the manufacture of articles of commerce. The term has acquired a wider significance in recent years in connection with the manufacture and sale of foods. According to state and national food laws, an article is adulterated:

1. If any substance has been mixed with it so as to lower its quality.
2. If any substance has been substituted wholly or in part for this article.
3. If any valuable constituent has been wholly or partially abstracted.
4. If the article be mixed, colored, powdered, or stained in a manner whereby damage or inferiority is concealed.
5. If it contain any added poisonous or harmful ingredient.

One of the most common forms of adulteration is the addition of water to milk. To prevent souring in warm weather, certain antiseptics, as boric acid and formaldehyde, are added. Another fraud, which is also a form of adulteration under food law definitions, is the skimming of milk. Yellow coal-tar colors and gelatin have also been added to milk and cream to give the appearance of richness. Butter is adulterated chiefly by the addition of artificial coloring matter, such as annato and coal-tar dye. Oleomargarine, a product made chiefly from tallow, lard, and cotton-seed oil, is sold as dairy butter. The same is true also of so-called renovated butter, a product made by melting and treating inferior or rancid butter in such a manner that, for a time at least, it appears fresh and sweet. Vinegar has been traditionally subject to adulteration. The sale of factitious cider vinegar, made entirely from white wine vinegar colored with burnt sugar, has been extensively carried on. Compounded vinegars are made by mixing cider vinegar in various proportions with white wine or distilled vinegar, and supplying certain deficiencies by the addition of molasses, glucose, or boiled cider. Enormous quantities of fraudulent maple syrup and sugar have been manufactured. These products have been derived only in part from maple sap, or, as has often been the case, they have been made entirely from raw or refined cane sugar. The requisite maple flavor has been imparted by mixing the product with an extract made from hickory bark. The use of so-called corn syrup or glucose as an adulterant of maple syrup has been practiced extensively. It has been stated that in years past Chicago has "produced" annually a quantity of maple sugar and syrup equaling the combined products of the states of New York, Vermont, and Pennsylvania. Spices are adulterated with inert materials, such as sawdust, nut shells, fruit stones, and waste products from wheat, corn, rice, and other grains. The essential oil is sometimes partly extracted from certain spices, as clove, cinnamon, and nutmeg, and in its place is substituted cotton-seed oil. In addition to being deprived of a large part of its oil, mustard has been mixed with flour, ground flax, and other seeds. Ground coffee is adulterated with chicory root, dandelion root, roasted beans, and cereals. Cotton-seed oil, tallow, and petroleum products are used for mixing with higher priced fats and oils, as lard and olive oil; glucose syrup is the common adulterant of molasses and honey; coal-tar dyes serve as a mask for other adulterants; wood alcohol, acetanilid, and various harmful coal-tar products are found in adulterated drugs.

The list of products other than foods and drugs which are liable to adulteration is also a long one. Whiting, barytes, and China clay are used as substitutes for white lead and zinc white; so-called linen often contains cotton, hemp, and tow; much that appears like silk is so-called artificial silk or only mercerized cotton; split leather is sold for calf skin, and lamb and other inferior leather for kid; wool felt is substituted for fur; imitation fur for the genuine, and so on. Laws against substituting inferior alloys for standard alloys of gold and silver have been enacted in some states. The enactment of laws to prevent adulteration of fertilizers has extended to all states using fertilizers in considerable quantities. The Maine experi-

ment station inspects field and garden seeds with reference both to vitality and purity, and the stations in several states exercise a control over the insecticides and fungicides on the market. Some states, as Minnesota and North Dakota, have laws designed to prevent fraud in linseed oil and paints.

Most of the food laws first enacted affected only dairy products; later these laws were amended, or new laws were enacted, so as to include all articles of food and drink. The enforcement of food laws in many states devolves on a food commission, but in a number of states it is in the hands of the experiment station or the board of health. The National Food and Drugs Act was passed and became a law in June, 1906. This law renders more effective the state laws by checking the interstate shipment of fraudulent products.

JULIUS HORTVET.

See PURE FOOD LAW.

Adventists, Second Adventists, or **Millerites,** a sect founded by William Miller in 1831, on a belief in the speedy coming of Christ to reign on the earth. The idea of Christ's second coming is not original with the Adventists. The sect baptizes by immersion. One branch of the church called Seventh Day Adventists observes Saturday, or the seventh day, the Hebrew Sabbath, as a day of rest. The six branches of the church have in all about 2,283 churches, 1,505 ministers, and 92,505 communicants. See SABBATH.

Advertisement, an announcement in print, usually of wants, or of goods for sale. The earliest newspaper advertising in this country is said to have appeared in the *New England Weekly Journal,* published in Boston in 1728. Announcements relative to books, importations of coffee, runaway slaves, sales of negro girls, a school for negroes, and the departure and arrival of ships are to be found in its advertising columns. Advertisements were considered beneath the dignity of the earlier periodicals. Magazine advertisements began with *Scribner's Monthly* in 1870. The custom was soon followed by other magazines.

One desiring to place an advertisement in a number of papers finds it advisable, at the present time, to make arrangements through some advertising agency, not only to save labor of corresponding, and the payment of numerous small bills, but as a matter of economy. Agencies placing a large amount of advertising are naturally able to make advantageous contracts. A bulletin published by the United States Census Bureau states that in 1905 $145,000,000 was paid for advertisements in American newspapers and in magazines; $15,000,000 for cards, folders, and postals of an artistic nature; $11,250,000 for the signboard advertising that shuts off the traveler's view along our lines of railroad, and $2,000,000 a year for street car advertising.

Commercial competition has become so keen, and the love of the American people for a change and for something novel has become so marked that it is well nigh impossible to carry on a prosperous business of any sort without advertising. The large city dailies require to take in from $20,000 to $40,000 a week from advertising. Single issues have been known to earn $30,000 in one day. The large New York dailies ask $70 a column for space. A page in a leading magazine costs from $200 to $500 per issue. John Wanamaker, the famous merchant, is said to have paid the Philadelphia dailies from $50,000 to $75,000 a year apiece for page advertisements. Ayer & Son of Lowell, Massachusetts, are said to spend $600,000 a year in advertising their remedies.

Aeacus, ē′a-kus. See AEGINA.

Aegean Sea, an arm of the Mediterranean situated between Greece and Asia Minor. It is bounded on the north by that portion of Turkey known to the ancients as Thrace and Macedonia. The Aegean receives the waters of the Black Sea through the Dardanelles. The coast is much broken by long promontories and by correspondingly long arms of the sea. Good harbors abound. The sea is studded with islands. The ancients who dwelt on the adjacent lands had a great variety of productions to offer in trade. The possibility of making short voyages from port to port, or from island to island, was fa-

vorable to early navigation, when the ship captain had no compass save the pole star. Under these circumstances, it is not surprising that the Aegean was the cradle of European commerce. The Aegean is also the sea of all seas prominent in early European art, literature, and history. It is not risking much to say that the earliest European navy sailed the Aegean. The Greeks called the sea the Archipelago or chief sea, and it was the chief sea of the world to them. The name has been extended to other seas, but with a changed meaning. The term is applied to seas, not on account of their importance, but because, like the original Archipelago, they contain a profusion of islands. The fisheries of the Aegean are considerable. The islands produce wheat, wine, olive oil, figs, raisins, honey, wax, cotton, and silk. The inhabitants are skillful divers for coral and sponges. Bands of expert divers from the Aegean frequent our coasts and engage in the sponge fisheries of Florida.

Aegina, ē-jī′nä, in Greek mythology, the daughter of Asopus, the river god. Zeus carried Aegina away to a rocky island in the Saronic Gulf of the Aegean Sea. Here their son Aeacus was born. As the island had no other inhabitants, Zeus transformed the ants of the place into men, calling them Myrmidons. Aeacus grew to manhood and ruled these people. He was renowned throughout Greece for justice and piety, and at death became one of the three judges of Hades. The island was named Aegina in honor of the nymph. See MYRMIDONS.

Aegir, ā′jir, in old Norse mythology, the god of the ocean. By race, Aegir was a giant. He has been called the god of the stormy sea, but he seems usually to personify the more propitious characteristics of the waters. Other names for him are Gymir and Hler. Aegir entertained the gods at harvest time and brewed their ale.

Aeginetan (ej-i-nē′tan) **Marbles,** a famous collection of marble statuary from the Greek island of Aegina. This island lies in the Aegean Sea, twenty miles off shore from the port of Athens. It is about nine miles in length and has a present population of about 7,000. At one time Aegina was the most important and the wealthiest commercial city of Greece. The famous naval victory over the Persians at Salamis was won largely through the prowess of the thirty ships of Aegina, though that did not protect the city from the growing power and jealousy of Athens. The temples and other public buildings of Aegina were on a scale of magnificence, still the admiration of the excavator and archaeologist. The ruins of seventeen Christian churches show also that the island was the seat of a flourishing civilization early in the Christian era.

Many statues and other prizes of classical art have been dug out of the ruins of the old city and carried away. A collection known as the Aeginetan Marbles is preserved in the royal art museum of Munich. A large room known as the Aeginetan Hall is given to the display. Many of the best specimens are from a noble temple of Zeus, or, as some think, of Athena, considered second only to the Parthenon in symmetry and beauty of proportion. The Danish sculptor Thorwaldsen spent no little time in studying these statues. He used plaster of Paris to replace fragments that had been broken off and lost. There are seventeen large groups representing events in the siege of Troy and in the lives of Hercules, Athena, Achilles, Ajax, etc. This famous statuary fairly rivals the Elgin Marbles from the Parthenon. The Aeginetan Marbles, however, are somewhat older, dating, it is believed, from about 475 B. C.

See ELGIN MARBLES; MUNICH; SCULPTURE.

Aegis, ē′jis, the shield of Jupiter. Among ancient writers the word sometimes designates the rushing stormcloud, enveloping the thunderbolt which was Jupiter's special weapon. Others apply the word to the skin of the goat, Amalthea, which Zeus used as defensive armor in his war with the Titans. Later writers regard the aegis both as a buckler and as a breastplate. In ancient art it frequently appears as a sort of mantle fringed with serpents, worn over the breast or left arm to serve as a defense in time of need. Jupiter permitted both Apollo and

Minerva to wear the aegis. The word aegis is used figuratively for any protective power or influence. In the *Iliad,* Homer (Bryant's translation) describes Minerva prepared for conflict:

Her shoulder bore
The dreadful aegis, with its shaggy brim
Bordered with Terror. There was Strife, and there
Was Fortitude, and there was fierce Pursuit,
And there the Gorgon's head, a ghastly sight,
Deformed and dreadful, and a sign of woe
When borne by Jupiter.

Aegisthus. See CLYTEMNESTRA.

Aeneas, ē-nē′as, a legendary Trojan chief, second only to Hector in the defense of Troy. He was the son of Anchises and the goddess Venus. His wife Creusa was the daughter of Priam the king. Their one child was Ascanius. Virgil chose Aeneas for the hero of his chief work, calling it the Aeneid. According to this writer, Aeneas escaped from the sack of Troy. After performing prodigies of valor he took his son Ascanius by the hand, and, bearing his aged father Anchises and his household gods on his shoulders, bade Creusa follow. In the confusion Creusa was lost and was never heard of again; but Aeneas made his way from the burning city to the shelter of Mount Ida, where he was joined by trusty companions. As soon as the times were propitious, twenty ships were built, and the remnant of the Trojans set out under his leadership to find a new home in the West. In the course of their wanderings, the aged Anchises died. Driven by a tempest to the coast of Africa, Dido, the queen of Carthage, received him kindly, and besought him to remain as her husband. Warned by the gods, however, Aeneas set sail, and the unhappy and deserted Dido put an end to her life on a funeral pile. Finally, Virgil would have us believe, Aeneas arrived at Italy and engaged in local wars, went down to the lower world to see his father, returned and settled in Latium, and married Lavinia, the king's daughter. He thus became the ancestor of the kings of Alba Longa, and of Romulus and Remus, the founders of ancient Rome. See VIRGIL; TROY; DIDO; AENEID.

Aeneid, ē-nē′id, **The,** the great epic poem of the Romans. It is ranked with the world's great epics. It was written by Virgil during the eleven years from 30 B. C. to 19 B. C., and consists of twelve books. Six of these treat of the wanderings and adventures of Aeneas and his followers after the Trojan War; and six treat of their struggles in the settlement of Italy. In the matter of composition, the Aeneid is the product of one mind. In that respect it may be classed with *Paradise Lost* and *The Divine Comedy,* rather than with such composite epics as the *Iliad* or *Beowulf.* The *Aeneid* was translated into English by Dryden. The work was long considered his greatest glory, but in reality Dryden's translation imperfectly represents the original. See EPIC; AENEAS; VIRGIL; TROY; DIDO.

EXTRACTS.

I fear the Greeks even when they offer gifts.
He runs on Scylla, wishing to avoid Charybdis.
In heavenly minds can such resentments dwell?
Not unacquainted with distress, I have learned to succor the unfortunate.

Aeolian (e-ō′lĕ-an) **Harp,** a stringed musical instrument played upon by the wind. Aeolus was the Grecian god of the winds, hence the name. A regular Aeolian harp is made by stretching eight to fifteen catgut strings or fine wires of equal length over a thin, fibrous wooden sounding box. The strings pass over low bridges at each end. The box should be adapted to the width of a window. It may be placed on a window sill with the sash raised sufficiently to allow the wind to play on the strings. The wind causes the strings to vibrate as wholes and in sections, producing sweetly mingled harmonies that swell and fall with the passing breeze, like a far off orchestra. Boys make what is to them a very satisfactory substitute for an Aeolian harp by stretching threads across long narrow apertures through which the wind blows. See HARP.

Aeolus, ē′o-lus, in ancient mythology, the father and god of the winds. He is represented as the son of Poseidon. His kingdom was the Aeolian isles, where he kept the winds shut up in a vast cave, lest they sweep earth and sky away. Sail-

ors were dependent upon Aeolus, who was able to set free a favoring breeze that brought their ship to port, or to let slip a devastating hurricane. Some located this home of the winds in Stromboli, where the rumblings of the volcano were regarded as the mutterings of the winds struggling to go free. The following passage from Conington's translation of the *Aeneid* gives the gist of the legend:

Here Aeolus, in cavern vast,
With bolt and barrier fetters fast
Rebellious storm and howling blast.
They with the rock's reverberant roar
Chafe blustering round their prison door;
He, throned on high, the sceptre sways,
Controls their moods, their wrath allays.
Break but that sceptre, sea and land,
And heaven's ethereal deep,
Before them they would whirl like sand,
And through the void air sweep.

Aeration. See TRANSPIRATION.

Aerolites. See METEORS.

Aeroplane. See AIRSHIP.

Aeschines, ĕs′kĭ-nēs (387-314 B. C.), a celebrated Greek orator. A native of Athens and rival of Demosthenes. In early life he was an opponent of Philip of Macedon, but was afterward won over. Aeschines ended his life as a teacher of rhetoric at Rhodes. Three orations are extant. A dignified statue of Aeschines was found amid the ruins of Herculaneum. It represents the orator standing quietly wrapped in his mantle. This statue is preserved in the National Museum at Naples.

Aeschylus, ĕs′kĭ-lus (525-456 B. C.), one of the three great tragic poets of Greece. He composed over seventy tragedies and won the annual prize for excellence thirteen times. Many of these works have been lost; seven remain—*The Persians, The Seven against Thebes, The Suppliants, Prometheus Bound, Agamemnon, The Choephori,* and *The Eumenides.* When a successful rival finally appeared in Sophocles, Aeschylus is said to have retired in mortification to Sicily, where an idle story runs that an eagle mistook his bald head for a stone, and letting fall a tortoise upon it to break the shell, caused the poet's death. Aeschylus was a native of Attica and was of aristocratic parentage. When a young man, he took part in the struggle of Greece led by Athens against the Persian power. He distinguished himself for bravery in the battles of Marathon, Salamis, and Plataea. He was much interested in public affairs, and understood the significance of the Persian defeats which made Greece, with Athens at its head, the leading power in the world. He was opposed to an oligarchy, and likewise feared the results of unbridled popular rule. The following passage, translated from the *Eumenides,* advises the citizens of Athens to steer between an oligarchy and anarchy:

Therefore, O citizens, I bid ye bow
In awe to this command, Let no man live
Uncurbed by law nor curbed by tyranny,
Nor banish ye the monarchy of Awe
Beyond the walls; untouched by fear divine
No man doth justice in the world of men.
Therefore in purity and holy dread
Stand and revere.

In the following quotation from the *Americana* reference is made to the strict rules which controlled the form of dramatic productions among the ancients:

It is remarkable that in Aeschylus and Sophocles no deficiency of dramatic interest attends this severity of form. Even in the earliest examples the metrical arrangements are consummate. The magnificent poetical quality of Aeschylus, the sense of overmastering fate with which he manages to charge all his drama, and the perfect humanity of Sophocles relieve their work entirely from the charge of sterility which has been brought against more modern imitations of their form.

See DRAMA; EURIPIDES; SOPHOCLES.

Aesculapius, ĕs-kū-lā′pĭ-us, in classic mythology, the god of medicine. He was the son of Apollo. He had wondrous skill in the healing art. On complaint of Pluto that mortals were prevented by him from dying, and that Hades was becoming depopulated, Zeus slew Aesculapius with a thunderbolt, but at Apollo's request placed him among the stars. In art he is represented usually as an aged, bearded man carrying a staff, around which a serpent, an emblem of wisdom, wraps its coils. His temples were placed usually without the city walls in some healthful spot, possibly near a fountain. The sick were wont to sacrifice a cock or goat to Aesculapius. In case of recovery a votive tablet recording the cure was hung up in

the temple. Physicians are sometimes called "disciples of Aesculapius." In Homer Aesculapius is not spoken of as a god, but simply as "the blameless physician."

Aesir, ā′sir, in Norse mythology, a collective name for the great gods. There were twelve of these gods and each had a throne in Gladsheim. Odin's throne was also there, but overtopped those of the twelve Aesir. The name Aesir is sometimes used collectively for all the Scandinavian gods, thirty-eight in number. See GLADSHEIM; ODIN.

Aeson, ē′son. See JASON.

Aesop, ē′sŏp (620-564 B. C.), a Greek writer of fables. The accounts of his life and writings rest on a slender foundation. Various regions contended for the honor of his birth. According to some accounts, while still young he was brought to Athens as a slave. On obtaining his freedom, he took up his residence at the court of Croesus, by whom he was employed as an ambassador at Delphi. According to one account, Aesop was entrusted by Croesus with the duty of distributing a sum of money at Delphi. Failing to do this satisfactorily, he was thrown headlong over a precipice. As a punishment a pestilence fell upon the city. No manuscript or other evidence of Aesop's writings has been preserved. He may have been merely a story teller. He may not have lived at all. During the brilliant period of Athenian literature, however, a collection of pithy anecdotes was known as "Aesop's Fables." These fables were well known to the Romans. They have been translated into many languages. A scholarly edition published in 1810 in Germany contains two hundred thirty-one fables. Many of them seem to be mere variations of similar fables extant among the Arabians, Hindus, Persians, and even Chinese. "Eastern Fables" would be quite as appropriate a name. " 'What a dust I do raise,' said the fly as he sat on the axletree of the chariot," is one of the sayings attributed to Aesop. See LOKMAN; LA FONTAINE.

Aetna, Mount. See ETNA, MOUNT.

Afghanistan, ăf-găn-ĭs-tän′, the land of the Afghans, a lofty plateau of Central Asia. The area is placed at 250,000 square miles, about three times that of Minnesota. Afghanistan lies east of Persia, from which country it may be entered by means of tedious caravan routes, leading ankle deep through burning sands; or the traveler coming by way of India may spend weeks climbing upward through the stony defiles of the Himalayas. For nearly a century this country was a bone of contention between the British authorities on the south and Russian influence on the north.

In a treaty negotiated between Great Britain and Afghanistan November 22, 1921, Great Britain recognized the independence of Afghanistan and the latter agreed not to receive Russian diplomats. The treaty provided for an exchange of diplomatic representatives between London and Kabul. Abdul Hadi, a noted Kabul journalist, was appointed first Afgan minister to the court of St. James, and Major J. H. Humphreys, of the Indian army, was appointed minister at Kabul. This treaty removed a long standing grievance from the Afghan government which had resented being compelled to negotiate with the British government at Calcutta instead of with London direct.

The swarthy Afghans are a haughty, warlike, treacherous, bargaining race of hillsmen of white blood. They are akin to the Persians, who also make up a considerable part of the 5,000,000 population. Save certain Tartar elements the religion of the people is Mohammedan. The government is rapacious, arbitrary, and cruel, but it fits in with local ideas of religion, and any change would be regarded with fanatic suspicion. The ruler is called the Amir. He resides at Kabul, a town of 70,000 people. Afghanistan is called a buffer state because it protects British India from Russia.

Travelers give various pictures of the country. One describes bare mountains, sandy wastes, dried up mountain torrents, glaring sun, and sand storms. Another speaks of eternal snowcaps on the mountains, desolate gray landscapes, blizzards, and the reign of winter. Another speaks of fierce mountain tribesmen, assassinations, highway robbery, poverty, starvation, a

lean and hungry land, and slaves toiling for hard masters. Others, again, speak of goats on the mountain slopes, waters guided along channels to irrigate fruitful meadows, gardens, orchards, and fields. The picturesque Arab-like Afghan who rides, fights, and trades; his caravan routes, trading towns, looms, shawls, and merchandise, attract the attention of others. No doubt the mountains are rich in minerals. Copper, iron, lead, and gold are obtained in small quantities. Lapis lazuli and other precious stones are found. Wheat, barley, and peas are sown in the fall and reaped in early summer. Rice, millet, and Indian corn are planted in the spring and gathered in the fall. Irrigated orchards produce apples, pears, almonds, peaches, quinces, plums, apricots, pomegranates, figs, and mulberries in abundance. Fresh, preserved, and dried fruits form a considerable part of the food of the people. American orchards and gardens are indebted to Afghanistan for choice species of fruit trees and ornamental shrubs. Fruits, silks, felts, rugs, carpets, musk, asafoetida, castor oil, madder, and indigo are for sale, as well as spices, wool, cattle, hides, tobacco, and tea. At present, merchandise is carried by means of horses and camels, but railroads are entering the country by way of Russia, Persia, and India.

See ASIA.

Africa, a grand division of the eastern hemisphere extending to the southwest. Like South America, it is a large peninsula. It is joined to the Asiatic mainland by the Isthmus of Suez, only eighty-seven miles in width. In outline Africa resembles South America. It tapers to a point at the south. A broad extension north of the equator gives the map a leg of mutton shape easily remembered by the schoolboy. The entire coast is remarkably regular, and may be drawn with easy curves, without a single deep gulf or bay to break the coast line. The entire shore line is 18,400 miles in length. The difference between the actual coast line and the shortest possible coast for the given area is less than that for any other grand division. Madagascar is the only large island.

PHYSICAL CONFIGURATION. If we except Australia, Africa has a more regular and even surface than any other grand division. A narrow fringe of low land runs around the coast; but in places, as at Cape Town and elsewhere, even this footing is crowded off into the ocean by precipitous sea walls. In general, the surface of the land is an elevated plateau. The Congo basin divides Africa into two parts. The region of the Sahara on the northwest lies at an elevation seldom, if ever, exceeding 2,000 feet. The rest of Africa seldom sinks below 2,000 feet in altitude. The average altitude of Africa is 4,000 feet. The principal mountain ranges are two. The Atlas Mountains run east and west opposite the Strait of Gibraltar,—greatest height 14,000 feet. The eastern highlands begin with the mountains of Abyssinia and continue with wide gaps southward to the vicinity of the Cape of Good Hope. In the Abyssinian region the highest peak is 19,000 feet above the sea. In the south the greatest altitude does not exceed 10,000 feet. Writers speak of a rift valley, a gigantic crack in the surface, occupied for the greater part of its course by the Nile River and the large lakes in which that river has its sources. It is along this valley that the "Cape to Cairo" railway is building. A second rift, parallel to the first named, lies between Abyssinia and the sea. Ancient volcanic cones, one of which is still active at times, may be found in these rifts.

LAKES AND RIVERS. Of lakes, the largest are found in the great rift, 2,000 miles from the Mediterranean. The Niger, the Congo, the Nile with its tributaries, and shorter streams, as the Orange and the Senegal, carry nearly all the water of Africa ultimately to the Atlantic Ocean. The sole African river of volume emptying into the Indian Ocean is the Zambezi.

TEMPERATURE. Africa lies so evenly balanced on the two sides of the equator that it has less variety of temperature than any other grand division. Traveling from the equator northward or southward the tropical heat indeed moderates, but if we exclude certain elevated regions which,

ASIA

1. Orang-Utan. 2. Gibbon. 3. House Monkey. 4. Flying Lemur. 5. Fruit Bat. 6. Malabar Squirrel. 7. Malay Bear. 8. Indian Elephant. 9. Hornbill. 10. Argus Pheasant. 11. Jungle Fowl. 12. Chinese Pheasant. 13. Tiger. 14. Dwarf Musk Deer. 15. Gavial. 16. Tree Shrew. 17. Python.

AFRICA

1. Gorilla. 2. Chimpanzee. 3. Mandrill. 4. Giraffe. 5. Koodoo. 6. Lion. 7. Hippopotamus. 8. Elephant. 9. Wart Hog. 10. Aye Aye. 11. Ruffed Lemur. 12. Banana Bird. 13. Gray Parrot. 14. Guinea Fowl. 15. Ostrich. 16. Shorthead Toad. 17. Chameleon. 18. Hyrax.

by way of contrast, are delightfully cool, Africa as a whole is decidedly torrid. The variation in rainfall is extreme. The most northerly region, that of the Atlas Mountains, is well watered. The vegetation of this region includes the cork oak, fig, olive, vine, and small grains. The brilliant flowers of this region make it a paradise for botanists.

The Great Desert. The Sahara is the African end of a large desert region, the greatest in the world, reaching from the Atlantic eastward across Africa and two-thirds of Asia. Save where interrupted by the Nile and by oases, it is a dreary waste of rock and sand. Copious rains on the distant mountains sink into the earth and reappear far out in the desert in the form of springs, around which groves of dense green date palms spring up,—the grateful oases of the traveler. The valley of the Nile with its peculiar vegetation and animals crosses the eastern end of the region.

Equatorial Africa. The equatorial region from the Gulf of Guinea to the great rift is a region of heavy rains and dense forests. The waters are full of crocodiles and hippopotamuses. The forests are the home of the baboons and manlike apes and huge serpents. The elephant, once abundant, has been all but exterminated for the sake of its ivory tusks.

The Prairie Region. Extending from the Atlantic eastward to Abyssinia, quite around the forest region, and back to the Atlantic again, like a huge horseshoe, is a savanna or well-watered prairie region. This is the home of the solitary baobab tree and of luxuriant grasses. Giraffes, antelopes, gnus, zebras, and quaggas feed in the open parks. The savanna region is the home of the lion, the leopard, the hyena, and the jackal. Between the savannas and the Sahara is a semi-arid belt which reappears in the eastern angle of Africa and divides South Africa with the savannas. If one were to travel in a straight line south from Algiers to Cape Town, he would pass through shifting scenery. Leaving the shipping in the harbor and the city with its white walls and round-topped mosques, the traveler would journey between fields, orchards, and vineyards and through palm groves, until the blue Mediterranean lay far in the rear and he found himself threading the Atlas Mountains. Once over the slope, the country becomes dryer and the vegetation scantier. At the southern foot, thorny camel's shrubs or acacia bushes grow in clumps, while the scouring wind whirls the sand in eddies between them. Farther south from the mountains all signs of vegetation cease. For a thousand miles the eye would rest on a dreary waste of rocks and drifting sand without sign of life, save now and then a caravan trail marked by the accumulated bones of 2,000 years, and here and there a welcome oasis with its springs and palm groves, and the tents and flocks of the picturesque Arabs. Holding still a southward course across the Tropic of Cancer, the traveler would enter the fringe of an occasional shower from the equatorial regions. Clumps of thorny plants and palms would become more and more numerous until he encountered fruitful, grassy, flowery savannas, with herds of antelopes; then deep, equatorial forests and the majestic river Congo. South of the forests, the savannas again, and another region of stinted vegetation lead to the grassy upland of the Cape region.

Population. Roughly speaking, a line drawn from the Atlantic Ocean, along the southern border of the Sahara region, to Abyssinia, then dropping abruptly south to the Indian Ocean, separates the white people from the black. This division into races is based on the profile, the shape of the head, hair, build, language, and aspect, rather than on the complexion. The Berbers, Arabs, Egyptians, Abyssinians, and the coast tribes of Somaliland are of the white race. Immediately south of the Arab country a broad belt of territory, called by the Arabs the country of the Sudan or the blacks, runs westward from Abyssinia to the Atlantic. It is the region in which the Senegambian and Guinea negroes live. This is the region of untold atrocities perpetrated by merciless, marauding Arab chiefs and greedy Cau-

casian slavers. The ancestors of the negro population of the New World came chiefly from this region. The region immediately on the equator and southward is occupied by various negro tribes known collectively as Bantus. The extreme southwestern corner of the continent near Cape Town is the home of the degraded Bushmen and Hottentots. They are classified as black people, but are not negroes. None of the African peoples have shown capacity for holding together in organized governments. The Arabs, Somali, and Abyssinians are not without bravery, but are not natural rulers of themselves or of others. Naturally, the conditions in Africa have changed but slowly. In the interior portions, for instance, slave traffic is still carried on. But under the influence of Europeans, conditions are gradually changing, as well as the customs.

POPULATION. Africa's population is approximately 140,000,000, divided roughly, but not equally, into white and black. Thus "African" is not a synonym of "negro" in the strict sense. The African whites are not, however, white when judged by European standards; they have been burned for too many centuries by the tropic sun to appear really white. The difference between white and black, therefore, is based upon the shape of the head, the profile, stature, hair and language, and not on the complexion. The white Africans live north and east of the Sahara; the blacks to the south of the desert, with a mixed race occupying the borderland between.

Just south of the white peoples' country is the Sudan, inhabited by the most northerly and the blackest of the true negroes. In this region the slave traders operated, and almost all the negroes in North America are descended from Sudan negroes. The Bantu country begins immediately south of the Sudan and just north of the equator. The Bantus are lighter colored negroes than the Sudanese, and are bound together by the ties of language only, since their physical aspect varies from very small to very large. The Bantu country extends southward over the remainder of Africa, embracing all except the southwestern corner, the home of the Hottentots and Bushmen. The Bushmen and Hottentots are not negroes, both having a yellowish rather than a black skin, and speaking a language of their own.

About sixty per cent of the African population still adhere to old heathenish superstitions, worshipping demons and fetishes, and indulging in wild and terrible rites.

POLITICAL DIVISIONS. As a result of the World War, the political geography of Africa has undergone considerable change. The former German colonies have been put under the mandatory rule of the Powers, and Egypt is now numbered among the independent states. The other independent states are Abyssinia, Liberia and, nominally, Morocco. The latter is really a French protectorate, with Spain controlling a strip along the Mediterranean. Italy changed the name of the former Turkish vilayets of Tripoli and Cyrenaica to the single name of Libya. The Union of South Africa is mandatory for the former German South-West Africa, which has been renamed South-West Protectorate. Togoland was divided between France and Great Britain. France is mandatory for Kamerun, a small portion of which was transferred to British Nigeria. Britain is mandatory for German East Africa, now called Tanganyika Territory. A small portion of German East Africa, however, was added to Portuguese East Africa, and the greater part of the provinces of Ruanda and Urundi were added to Belgian Congo. Thus, by considering territory under the mandate of a Power as in the Power's possession, it is found that Africa is apportioned as follows:

Great Britain, square miles	4,364,000
France, square miles	4,200,000
Belgium, square miles	930,000
Portugal, square miles	788,000
Italy, square miles	650,000
Abyssinia, square miles	350,000
Spain, square miles	140,000
Liberia, square miles	40,000

These figures give the total area of Africa as 11,462,000 square miles, which is a close approximation to accuracy.

INDEPENDENT—
Abyssinia,
Egypt,
Liberia,

Morocco.

UNDER BRITISH CONTROL OR OWNERSHIP—
Togoland, North Half,
Ascension Island,
Tanganyika Territory,
Basutoland,
Bechuanaland Protectorate,
Kenya Colony,
Uganda,
Zanzibar,
Mauritius,
Nyasaland,
Rhodesia,
St. Helena,
Seychelles,
Somaliland Protectorate,
Swaziland,
Nigeria,
Kamerun,
Gambia,
Gold Coast,
Ashanti,
Sierra Leone,
Anglo-Egyptian Sudan,
Union of South Africa,
Cape of Good Hope,
Natal,
The Transvaal,
Orange Free State,
Southwest Africa.

UNDER FRENCH CONTROL—
Algeria,
French Congo,
Kamerun,
Madagascar,
Mayotte and the Comoro Islands,
Reunion,
Somali Coast,
West Africa and The Sahara,
Senegal,
Guinea,
Ivory Coast,
Dahomey,
French Sudan,
Mauritania,
Togoland, South Half.

UNDER ITALIAN CONTROL—
Somaliland,
Eritrea,
Tripoli.

UNDER PORTUGUESE CONTROL—
Cape Verde Islands,
Guinea,
Prince's and St. Thomas' Islands,
Angola,
Mozambique.

UNDER BELGIAN CONTROL—
Belgian Congo.

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Agamemnon, ag-a-mēm'non, in Greek legendary history, king of Mycenae, "rich in gold," situated midway between Athens and Sparta. He was the brother of Menelaus, king of Sparta, whose wife, Helen, was carried away by Paris, son of Priam, king of Troy. As a sort of overlord, Agamemnon was a central figure, but not the hero of the band of chieftains who united to avenge the wrong done Menelaus. The ten years' siege of Troy, the death of Priam, Paris, Hector, and the final taking of the city by the introduction of men within the gates by the stratagem of concealing them in a huge wooden horse, are told in the *Iliad* of Homer and the *Aeneid* of Virgil. On Agamemnon's return from the Trojan war he was slain by his wife Clytemnestra and her guilty lover. *Agamemnon* is the title of one of Aeschylus' tragedies.

Agassiz, ăg'a-see, **Alexander** (1835-1910), an American naturalist, the only son of Louis Agassiz. He was educated at Harvard, and after graduating in 1849 he studied engineering and chemistry. In 1866 he became superintendent of the Calumet and Hecla copper mines in the region of Lake Superior. He developed these deposits until they became the most valuable copper mines in the world, Agassiz himself acquiring a fortune by this success. In 1874 he was appointed curator of the museum at Cambridge, Massachusetts, and from this time devoted himself and his fortune to zoölogical research. Among other important tasks he assisted in arranging the collections made during the exploring expedition of the Challenger. He was a member of the National Academy of Sciences and of many scientific societies of America and Europe. He is the author, with Mrs. Elizabeth Agassiz, of *Seaside Studies in Natural History, Marine Animals of Massachusetts Bay,* and of the fifth volume of *Contributions to the Natural History of the United States,* which work his father had left incomplete. See CHALLENGER EXPEDITION.

Agassiz, ăg'a-see, **Louis** (1807-1873), an eminent scientist. Born at Neuchatel, Switzerland, May 28, 1807. Died at Cambridge, Massachusetts, December 14, 1873.

He was the son of a Protestant minister. He studied medicine at Zurich, Heidelberg, and Munich, and became professor of natural history at Neuchatel in 1832. He was acquainted with Cuvier and Humboldt. His first published work was a description of fishes brought from Brazil, 1831. He increased his reputation by a five volume work in French, 1842, entitled *Researches on Fossil Fishes,* in which he made several improvements in the classification of fishes. With Guyot he studied the glaciers of the Alps. In 1848 Agassiz accepted the chair of zoölogy and geology at Harvard. He rejected the evolutionary theory of the origin of animals. In 1868 Agassiz was made a non-resident professor of natural history at Cornell University. Although Agassiz's opinions are not always accepted by scientists, he is conceded by all to have been a great teacher and a wonderful man. He gave the study of natural history a tremendous impulse in this country. He was devoted to field work and inspired his students with a love of nature. He established the first marine biological laboratory in this country, on the island of Penekese, southwest of Massachusetts. He lies buried near the graves of Lowell and Longfellow in Mount Auburn cemetery, Cambridge. A boulder from the Aar glacier in Switzerland marks his resting place. The following lines are from a poem read by Longfellow at a dinner given Professor Agassiz on the occasion of his fiftieth birthday:

And Nature, the old nurse, took
The child upon her knee,
Saying: "Here is a story-book
Thy father has written for thee."

"Come, wander with me," she said,
"Into regions yet untrod;
And read what is still unread
In the manuscripts of God."

And he wandered away and away
With Nature, the dear old nurse,
Who sang to him night and day
The rhymes of the universe.

Agate, ăg′at, a variety of quartz frequently composed of many bands or layers of different colors. It is related to chalcedony, carnelian, and onyx. The moss agate owes its appearance to a peculiar moss-like stain of manganese or iron-oxide, spreading and branching like frost on a window pane. The name "mocha stone," sometimes applied to moss agates, is either due to the fact that those first used came from Mocha in Arabia, or it is a corruption of "moss agate." While the finest moss agates are obtained from India, they are found in many localities in the states of Utah, Wyoming, Colorado, and Montana. Very fine agates are found near Oldenburg in Germany. The best occur as rolled pebbles in the beds of streams. Kunz remarks that "no stone that is used in jewelry in the United States is cheaper, more beautiful, or more plentiful than the moss agate." Cloudy agates, stone agates, and the like, are names of other varieties. Agates make very attractive ornaments, and are used in rings and seals, in the handles of knives and forks, toilet articles, button hooks, and the like, or for beads, marbles, etc. On account of their hardness, agates make excellent watch jewels and bearings for pivots and scales. Gold wire is drawn through an agate eye. In Scotland agates are known as "Scotch pebbles." The British Museum possesses a peculiar Egyptian agate bearing an accidental likeness to the face of the poet Chaucer.

Agave, ȧ-gā′ve, a genus of plants related to the narcissus and daffodil. The best known species is the American aloe or century plant. This agave produces a spreading clump of long, fleshy leaves with spiny margins. After years of waiting, whence the name "century plant," a leafless flower stem suddenly shoots up from the center to a height of from ten to possibly thirty feet and bears a profusion of lily-like flowers. The plant is then exhausted and dies. There are about one hundred and fifty different kinds of agaves, all natives of the warmer parts of America. Some seventy-five kinds are under cultivation and observation in the botanical garden at Washington, and as many in the Missouri Botanical Garden at St. Louis. The Mexican agave yields a sweet juice from which pulque, the national beverage of Mexico, is manufactured. The American agave has been in-

troduced into southern Europe and northern Africa with a view to its use as a hedge. It grows luxuriantly in all parts of Italy, where it is seen clinging to precipitous walls of tufa or striking its roots into the loose and dry volcanic soil along the roadsides. The spiny leaves form hedges which turn stock like a wall of bayonets. The leaves of the agave grown in Italy are used for the manufacture of hemp; and, cut into slices, are fed to cattle. The leaves of the various agaves are full of fibers or threads running lengthwise. When the green leaves are soaked in water for a length of time, the pulp rots and separates from the fibers, which may then be drawn out. An agave of Yucatan yields an immense amount of so-called sisal hemp. It is imported into the United States to be twisted into cables, ropes, and string. A large part of the cordage in use in this country is made of sisal. When a farmer puts a ball of binding twine in place on his self-binding harvester, the chances are that he is handling the fibers of agave leaves. Very likely they were shipped in bales from the Yucatan coast to be made into balls of twine in some American factory. See PULQUE; SISAL.

Age, a term of various meanings, including, among others, the length of time elapsing since one's birth. In the United States a person is said to be of age when 21 years old, though in many states a girl becomes of age at 18. A man may be a United States representative at 25, a senator at 30, and president at 35. At 21 a man may vote and is liable for poll tax. He may be drafted into the militia at 18, but is exempt from poll tax and military service after 45. A child is not responsible for crime committed under the age of 7, and only partially so up to the age of 14; but may be sent to a house of correction or reform school at any age. A youth may be executed for murder at 14. An oath of allegiance may be taken at 17. Children are competent to give testimony at any age, but the court and jury are free to decide the degree of credibility to be given such testimony. In England a member of Parliament must have attained the age of 21; a priest, 24; a bishop, 30, and a minor may assume the throne at 18.

The age to which man, the lower animals, and plants live is not a matter of definite record. It is certain, however, that some animals live longer than man, and that some plants live longer than any animal. Among the older trees are the cocoanut palms of Brazil, 700 years old; Arabian date palms, 300; Wallace's Oak at Paisley, Scotland, 700; eight celebrated olive trees on the Mount of Olives at Jerusalem, 1,000; yews at Fountains Abbey, England, 900. Other celebrated chestnut, cypress, and oak trees are known to be in the neighborhood of 1,000 years old. By counting the rings of annual growth, Adamson, the botanist, estimated the age of certain baobab trees in Africa at 3,000 to 5,000 years. The giant sequoias of California contend with the baobabs for the honor of being the oldest living things on the face of the earth.

Among animals the swan is known to have lived over 100 years. The stork and the parrot have been known to live more than a century. The elephant and the rhinoceros are reputed to live 200 to 300 years. An elephant is known to have lived 130 years after his capture. Estimated on the basis of the layers of whalebone, whales are thought to attain an age of 400 years. Carp are credited with 150 years, and in 1497 a pike was caught in Austria wearing a brass ring dated 1230, or 267 years back. A tortoise from the island of Seychelles was shown at the St. Louis Exposition, with a well-attested claim to an age of 250 years.

The average age of human life is a little over 33 years. Many people live to 70 years, and occasionally one attains 100 years.

The term age is also used in geology to denote a period of time. See ARCHEOLOGY.

Agent, the legal appellation of one who is authorized to act for another, or others, called the "principal." A further distinction is made between general and special agents, the latter having power to transact only special business. An agent may be employed by his principal on salary, or he may be recompensed

on the commission plan; and in any case, the position of the agent is always one of trust and responsibility. When the agent does not reveal the identity of his principal he is responsible to third persons, but, unless he exceeds his authority, is not so responsible when the principal is known. The principal, however, is usually responsible to third persons for civil offenses committed by the agent when acting within his authority, which he derives from the principal. But this does not relieve the agent of personal responsibility himself. The law gives an agent a lien upon the property of the principal that may be in his hands, in order that he may enforce payment for his services.

Agincourt, ah-zhan-koor′, a French village about thirty miles from the English Channel. It is noted as the scene of a victory won by the English over the French, October 25, 1415. Fifteen thousand English under Henry V routed 50,000 French under Constable d'Albret. The French horse fell into the mire. The battlefield became a scene of butchery. Six dukes, many lords and knights, and 10,000 men-at-arms fell. Agincourt is called sometimes the "French Flodden."

Agnosticism. See THEISM.

Ag′nus De′i, in ecclesiastical affairs, the figure of a lamb bearing a cross. The emblem is symbolical of the Saviour, the Lamb of God, a sacrifice offered for the redemption of a guilty world. The medieval sculptors used the emblem freely in their designs. The small cake made with the wax of Easter candles, and imprinted with this figure, is known as an Agnus Dei. The popes used to bless these cakes and distribute them freely on the Sunday after Easter. In later days of the church, however, the pope sends an Agnus Dei only to prominent ecclesiastics and this only on the occasion of his election and every seven years thereafter. The gift of a papal Agnus Dei is considered an honor. An anthem introduced into the Catholic Missal about 700 is called Agnus Dei. It is a paraphrase of John i: 29. It takes its name from the opening Latin words which signify "O, Lamb of God, who taketh away the sins of the world, have pity on us." This anthem has a prominent part in the celebration of mass.

Agouti, ȧ-goó tī, a genus of gnawing mammals related to the guinea pig. The agouti is found in parts of South America and in some of the West Indian Islands. There are several species. The common agouti has the general appearance of a rabbit, but it is larger. It is sometimes called the South American hare. The toes are armed with strong claws for securing food; but, unlike the rabbit, the agouti does not burrow. The tail is a short naked stump on which the animal sits when eating. The agoutis are forest animals. They live in colonies and feed on vegetable food entirely. Roots and nuts are a favorite diet. Like the woodchuck, the striped "gopher," and the prairie dog, the agouti is a pest, especially in sugar growing localities. The little animals destroy the sugar plantations by gnawing the roots of the cane. The planters poison them in great numbers. The natives of Brazil and Guiana regard the flesh of the agouti as a delicacy. See GUINEA PIG.

Agricola, ä-grĭk′o-lä (37-93 A. D.), a famous Roman soldier and statesman. He was for many years the commander of the Roman forces in Britain. He pursued an intelligent policy in the management of British affairs. He established the power of Rome as far northward as the Scottish Highlands. His fleet sailed around Great Britain and proved that it was an island. Military roads, temples, baths, and other public improvements were made on a scale of magnificence calculated to impress the Britons with an idea of the greatness of Rome. Few who have not investigated the subject are aware of the magnitude of Roman works in the island, many remnants of which may still be seen. Among other enterprises undertaken by Agricola was the construction of a row of fortresses entirely across the northern end of the island from the Firth of Forth to that of the Clyde. This was intended to exclude the barbarians then inhabiting the north of Scotland. The British chieftains were encouraged to send their sons to Rome for an education, and

many did so. The life of this general has been well described by his son-in-law, Tacitus, in a small volume called *Agricola.*

Agricultural Experiment Stations. See EXPERIMENT STATIONS.

Agricultural Education. Agricultural education is of comparatively recent origin. A few isolated attempts to place agriculture on a scientific basis were made in the 17th and 18th centuries but systematic agricultural education was not begun until the last half of the 19th century. Now, in most of the countries of Europe and the United States and Canada it extends from the rural schools to the agricultural college. The scheme of agricultural education naturally falls into four divisions: (1) Agricultural colleges; (2) Secondary schools; (3) Rural schools; (4) Extension work.

AGRICULTURAL COLLEGES. Collegiate education in agriculture began in the United States by the introduction of the chemistry of agriculture into the course of study of the Philadelphia Academy in 1751. This Academy later became the University of Pennsylvania. The prospectus of King's College, New York (Columbia University) for 1754, mentions "animal husbandry" among its studies. In 1792 this college established a professorship of botany. Other colleges followed these leads, and at the outbreak of the Civil War there were a number of flourishing schools of agriculture in the country. The war for the time prevented further development of agricultural education, but in the midst of that conflict, in 1862, the Morrill Act was passed. This granted to each state 30,000 acres of land for each member of Congress, the entire proceeds of the sale of this land to be set aside as a perpetual fund for the support of the colleges of agriculture and mechanic arts. The Act was supplemented in 1890 by a second Morrill Act, and in 1916, in addition to the above aid, provision was made for granting each agricultural college an annual fund of $50,000 for instruction and $30,000 for experiment stations. Every state and Hawaii and Porto Rico now have one or more agricultural colleges, supported wholly or in part by these funds. In a number of the southern states separate colleges are maintained for negroes.

Most of the colleges require the equivalent of a four years' high school course for admission, and they maintain four year courses in the various departments of agriculture such as agronomy, animal husbandry, dairying, etc., so that students may specialize in any line they prefer. Many state colleges give short courses during the winter for the purpose of assisting farmers who have not had opportunity for obtaining an agricultural education. An experiment station is connected with each state agricultural college. This is supported largely from the government fund. See EXPERIMENT STATION.

HIGH SCHOOLS. The first successful agricultural high school was established by the University of Minnesota in 1888. Notwithstanding the success of this school only ten others were established during the next ten years, but agricultural education has been rapidly extended since that time and now nearly every state agricultural college has an agricultural high school. In addition to these many city and town high schools have courses in agriculture.

ELEMENTARY SCHOOLS. Instruction in agriculture in the elementary schools in the United States has been developed since the beginning of the 20th century, although in France such instruction has been compulsory since 1879. Now, the study of the elements of agriculture is required in the public schools of nearly all states. The work does not consist of the study of books merely, but includes garden making and the carrying on of various farm and household activities with which the boys' and girls' clubs are intimately associated, so that the work of the class room and the work in the field supplement each other.

EXTENSION WORK. This consists of those movements which have for their purpose bringing instruction to the farmer who is not able to attend an agricultural college or other school. One of the oldest of these agencies is the farmers' institute which is still active in many states. Finally, the county agent, who is

a graduate of an agricultural college and a practical farmer as well, brings the rural communities into direct contact with the institution which he represents.

Agriculture, the business of tilling the soil. With the exception of the chase and possibly the care of half domesticated animals, the planting and harvesting of crops is the most ancient, as it certainly is the most honorable, of occupations.

Since "Abel was a keeper of sheep," and "Cain was a tiller of the ground," a great advance has been made. The history of agriculture is too extensive for even an outline. It includes the development of oats, rye, barley, wheat, corn and other cereals from wild grasses; cabbage, beets, tomatoes, potatoes, and other vegetables from wild plants with little food value; serviceable breeds of horses cattle, and sheep from wild animals; and implements and machinery from the rude sticks, thin edged stones, and shells of the first husbandmen. Wheat, once rubbed in the palm of the hand or beaten from the sheaf with a stick, is now removed from the straw by a steam threshing machine at the rate of 2,000 bushels a day. The crooked stick with which primitive man scratched the ground has been developed into the motor plow turning a dozen furrows at a time. The cotton gin, seeder, mower, reaper, thresher, windmill, and farm engine have done much to relieve the drudgery of farm work as well as to increase production. The use of machinery for ditching, roadmaking, plowing, sowing, mowing, raking, reaping, husking, shelling grinding digging root crops storing, pumping, butter making, ginning, breaking, flax spinning, weaving, and sewing leavse little room on the farm for unskilled labor.

During the decade of 1910-1920 agricultural education gained a remarkable impetus. Agriculture is now a required study in the elementary schools of the Union and in each of the Canadian provinces. Agricultural high schools are common and there is one or more agricultural colleges and experiment stations in every state and Canadian province. Boys' and girls' clubs, canning clubs, pig clubs, and calf clubs are found in many school districts, and in many counties there is a specially trained agriculturist or county agent to advise with and assist the farmers and the various clubs of the county.

The practice of scientific agriculture is becoming more prevalent each year. The accompanying table shows among other things that the increase in urban population is much larger than the increase in the number of farms. Moreover, previous to 1910 there was still a great area of public land open to settlement. Between 1910 and 1920 that land was occupied and with its occupation the opportunity of expanding the tillable area of the United States, except by irrigation, passed. To supply the demands of a growing population agricultural methods must change, more intensive farming, insuring a larger yield per acre, becomes imperative. Only a few of the large ranches of former days remain. Most of them have been divided into smaller farms that admit of more thorough cultivation. The one crop practice in the corn belt, the wheat belt and the cotton belt, has likewise been generally abandoned. Throughout the country farmers realize that crop rotation is essential to the maintenance of production.

The experiment stations are giving special attention to the improvement of the leading crops in their respective states through the development of better strains of wheat, corn, potatoes, vegetables and fruit. Farmers are exercising greater care in the selection of seed, and the adaptation of fertilizers to their soil. The experiment stations are in close touch with the farmers, and render them all possible assistance. These efforts have met with commendable results. Statistics show that the increase per capita in the number of bushels of wheat is from 5.5 in 1860 to 7.4 in 1919, and that the increase in the production of corn was from 22.2 to 26.2 bushels during the same period. The best authorities state that the general agricultural production of the country can be increased at the rate of 2 per cent per annum for the future.

1. Planting

2. Cultivating

3. Corn Harvester

4. Fodder in the Shock

5. Corn Picker

6. Husker and Shredder

1. Sowing the Seed

2. Cutting the Ripe Grain

3. Field of Shocks

4. Wheat in the Stack

5. Threshing Scene

6. Combined Harvester and Thresher

WHEAT

Population, Farms, Farm Land and Farm Property in the United States: 1920 and 1910

Item	1920 (January 1)	1910 (April 15)	Increase, Amount	Increase, Per cent
Population, total	105,710,620	91,972,266	13,738,354	14.9
Rural	51,406,017	49,806,146	1,599,871	3.2
Urban	54,304,603	42,166,120	12,138,483	28.8
Per cent rural	48.6	54.2		
Number of farms	6,448,343	6,361,502	86,841	1.4
Approximate land area of the country—acres	1,903,215,360	1,903,289,600	—74,240	
All land in farms—acres	955,883,715	878,798,325	77,085,390	8.8
Improved land in farms—acres	503,073,007	478,451,750	24,621,257	5.1
Woodland in farms—acres	167,730,794	190,865,553	—23,134,759	—12.1
Other unimproved land in farms—ac.	285,079,914	209,481,022	75,598,892	36.1
Per cent of land area in farms	50.2	46.2		
Per cent of farm land improved	52.6	54.4		
Average acreage per farm	148.2	138.1	10.1	7.3
Average improved acreage per farm	78.0	75.2	2.8	3.7
Value of all farm property	$77,924,100,338	$40,991,449,090	$36,932,651,248	90.1
Land and buildings	66,316.002,602	34,801,125,697	31,514,876,905	90.6
Land alone	54,829,563,059	28,475,674,169	26,353,888,890	92.5
Buildings	11,486,439,543	6,325,451,528	5,160,988,015	81.6
Implements and machinery	3,594,772,928	1,265,149,783	2,329,623,145	184.1
Livestock	8,013,324,808	4,925,173,610	3,088,151,198	62.7
Average value per farm:				
All farm property	$12,084	$6,444	$5,640	87.5
Land and buildings	10,284	5,471	4,813	88.0
Land alone	8,503	4,476	4,027	90.0
Buildings	1,781	994	787	79.2
Implements and machinery	557	199	358	179.9
Livestock	1,243	774	469	60.6
Average value per acre of lands in farms:				
All farm property	$81.52	$46.64	$34.88	74.8
Land and buildings	69.38	39.60	29.78	75.2
Land alone	57.36	32.40	24.96	77.0
Buildings	12.02	7.20	4.82	66.9
Implements and machinery	3.76	1.44	2.32	161.1
Livestock	8.38	5.60	2.78	49.6

NOTE—A minus sign (—) denotes decrease.

AGRICULTURE IN CANADA

Canada, more predominantly than the United States, is an agricultural country. There has been, to be sure, a marked trend of population from the farms to the cities, with the result that the urban population, which was about 40% of the total in 1901, is now almost one-half. Yet the yearly crop of spring wheat is worth about as much as all the manufactures of the Dominion, and the hay crop, as a rule, is worth considerably more than all the minerals mined. The extent of agriculture in 1921 is expressed in the following statement:

Area of the Dominion, acres	977,585,513
Area in farms, acres	125,000,000
Number of farms	750,000
Improved acreage	55,000,000

It must not be imagined that these figures are fixed. On the contrary, there are considerable variations from year to year, but the general movement is upward. For example, the year 1917, which was the

first year in which field crops were valued at more than one billion dollars, showed a total of almost exactly double 1912; the latest available figures (1921) show a total of almost an even $1,000,000,000.

Agriculture today represents a capital investment in Canada of more than $7,000,000,000. Of this amount Ontario claims about one-fourth, while the three prairie provinces together share about one-third. Not so many years ago the plains of Alberta, Saskatchewan, and Manitoba were regarded as useful only for grazing, but now they are one of the greatest grain-growing regions in the world. For years Ontario led the provinces in the production of wheat and oats, but since 1911 Saskatchewan has ranked first in both of these grains. The following table shows the tremendous increase in the yield of field crops:

	Bushels			
	1870	1890	1910	1921
Fall Wheat	6,367,000	14,686,000	20,408,000	15,520,000
Spring Wheat	10,355,000	27,536,000	111,669,000	285,337,000
Barley	11,496,000	17,222,000	28,848,000	59,709,000
Oats	42,489,000	83,428,000	245,393,000	426,232,000
Rye	1,064,000	1,341,000	1,542,000	21,455,000
Corn	3,802,000	10,711,000	14,417,000	14,904,000
Buckwheat	3,802,000	14,914,000	7,102,000	8,230,000
Potatoes	47,330,000	53,490,000	55,461,000	107,246,000
Peas	9,905,000	14,823,000	4,788,000	2,769,000
Beans	220,000	800,000	826,000	1,089,000
Flax	.....	138,000	4,244,000	4,111,000
Hay and Clover	3,818,000	7,693,000	10,406,000	11,366,000

During this same period there was an equally marked increase in the number of farm live stock in Canada, as shown by the regular census. The figures follow:

	1871	1891	1911	1921
Horses	836,000	1,470,000	2,598,000	3,813,000
Milch Cows	1,251,000	1,857,000	2,595,000	3,736,000
Other Cattle	1,373,000	2,263,000	3,930,000	6,469,000
Sheep	3,155,000	2,563,000	2,174,000	3,675,000
Swine	1,366,000	1,733,000	3,634,000	3,904,000

These figures make possible some interesting comparisons. For example, during the fifty years between 1871 and 1921 the population of the Dominion increased about 140%, while the production of wheat increased nearly twenty-fold, of barley more than five-fold, of oats more than ten-fold, and of rye more than twenty-fold. In other words, Canadian agriculture has kept progress with the improved methods followed in other countries, with the result that the Dominion's agricultural resources are being properly utilized.

In some respects agriculture has reached its highest development not in the grain-growing prairie provinces, but in the sections which have been settled the longest. In Prince Edward Island, in a few sheltered valleys in Nova Scotia and New Brunswick, in the St. Lawrence valley above Quebec, and in the Ontario peninsula, agriculture has reached a stage of intensive cultivation. It is true, however that these sections are better known for the quality of their output than for their total value. Potatoes and turnips receive special attention in the Maritime Provinces. The Annapolis Valley in Nova Scotia is noted as one of the richest apple districts in the world. But Ontario produces nearly three-fourths of the apple crop of Canada. Southern Ontario, especially the Niagara peninsula, is famous for the variety and excellence of its fruits. British Columbia, because of great variety in soil and climate, has become highly diversified, and many fruits and vegetables are raised there. Apples, peaches, plums and small fruits are grown very successfully in the warm delta of the Fraser River which is well adapted to fruit culture.

Diversification. There has been a marked tendency toward diversification throughout the Dominion in recent years.

The farms on which wheat is the only crop are now rare, even in the western provinces, and nowadays many farmers raise cattle, horses, swine, and perhaps even a few sheep. Dairying, poultry-raising, and such smaller branches as bee-keeping, have all shown a remarkable development. The establishment of the dairying industry on a factory basis is one of the notable developments of the last two or three decades; in 1891, the first year in which records were kept, the value of factory-made butter, cheese and condensed cream, was $10,780,000, while today the annual total is over $100,000,000.

How the Government Helps the Farmer. In a young and growing country, it is not enough that the government keep records of agriculture. This fact has been appreciated in Canada from the start, and the Department of Agriculture was one of the original branches of the executive. One of the most valuable features of the department's work is the experimental farms, the first of which was established in 1887. In addition to the central farm at Ottawa there are now about twenty branch farms scattered from Charlottetown, P. E. I., to Sidney and Summerland, B. C., all of which are constantly working for the improvement of agricultural methods. They give information as to the best way to prepare the soil for this or that crop, the most profitable crops to raise, the best kind of fodder or silage for cattle or hogs under particular conditions, and a thousand and one other items which any farmer might want to know. Epidemic animal diseases have been eliminated through the government's efforts, and government registration of pedigreed live stock has brought a marked improvement. The government maintains model creameries and cheese factories, and inspectors show the farmer the best way to pack his products. Through Canadian commercial agents, stationed in large cities the world over, the market for Canadian produce has been studied and steadily extended. These are only a few of the ways in which the government helps the farmer.

Each province also maintains a Department of Agriculture with a cabinet minister or a secretary of agriculture in charge of it. Many of the provinces support agricultural colleges, which in the western provinces are part of the provincial university. Grants are also given to privately endowed agricultural colleges, especially in the Province of Quebec.

The activities of the Provincial Department of Agriculture include: the maintenance of demonstration farms; provision for selected seed; maintenance of a corps of county agents and demonstrators whose work includes assistance to farmers and the development of school fairs and agricultural projects; help in research work in the agricultural sciences; the promotion of agricultural fairs; the publication of bulletins of information and instruction to farmers.

Agriculture, Department of

The Bureau of Agriculture was organized in 1862 as a branch of the Department of the Interior. In 1869 the Bureau was raised to the rank of a department, and placed in charge of a Secretary of Agriculture, who became a member of the President's cabinet. Norman B. Coleman, who was commissioner of agriculture, was the first secretary. The fourth secretary, James Wilson, of Iowa, held the office for four consecutive terms and under his administration the department became highly efficient and widely extended its fields of activity. Excepting the Postoffice Department, the Department of Agriculture comes in direct contact with more people than any of the other executive departments. Its activities have multiplied until they include practically every phase of rural life, and the benefits it has conferred upon the farmers are beyond estimate.

At the time of its organization, the department included the bureaus of plant industry, animal industry, chemistry and soils. In 1891 the Weather Bureau was added; the department also assumed charge of all government experiment stations. Other bureaus and divisions have been added as the need for them has arisen. The most important of these additions include the bureaus of biological survey, entomology, crop estimate, the division of publications, the forestry service,

the office of public roads and the states relation service. See WEATHER BUREAU; FORESTRY; ROAD.

THE BUREAU OF PLANT INDUSTRY makes a study of farming under various conditions, conducts researches in plant breeding, studies the possibilities of plants, including forest trees; investigates farm demonstration work in up-to-date farm practice. It studies the possibilities of new crops in various localities and aids farmers in the introduction of new varieties of grain and other plants that will tend to increase production.

THE BUREAU OF ANIMAL INDUSTRY conducts research work on animal diseases and on breeding, and investigates methods of dairying and the distribution of milk.

THE BUREAU OF SOILS makes a study of the chemistry and physics of the soil, surveys the soil in various localities and makes maps of such surveys. It studies soil fertility and gives advice on fertilizers.

THE BUREAU OF CHEMISTRY conducts researches in the chemistry of drugs, foods, fertilizers, etc., exposes adulterations and other fraudulent devices. See ADULTERATION; PURE FOOD LAW.

THE BUREAU OF BIOLOGICAL SURVEY studies the food habits of animals, maps out life zones and conducts researches on the distribution of plants and animals.

THE BUREAU OF ENTOMOLOGY makes a special study of insects, determines those that are beneficial and those that are injurious and issues bulletins on methods of preventing and destroying insect pests.

THE BUREAU OF CROP ESTIMATES issues the monthly crop bulletins and other statistical matter.

THE FORESTRY SERVICE has charge of the forests on public lands and in the national forest preserves. It also assists state forestry organizations and individuals in the preservation of their forests.

THE OFFICE OF PUBLIC ROADS gives information relating to the construction and maintenance of public roads and conducts experiments in road making.

THE STATES RELATION SERVICE cooperates with schools, homes and communities in organizing boys' and girls' clubs, community centers and other organizations.

THE DIVISION OF PUBLICATIONS has charge of printing all the publications of the Department. Most of these consist of bulletins, circulars and other pamphlets and they can be obtained free of charge, by writing for them. Address Chief of the Division of Publications, Department of Agriculture, Washington, D. C. A monthly list of these publications can also be obtained at slight cost by writing for it. The total publications of the Division exceed 34,000,000 copies a year.

Agrippa, Herod I (11 B. C.-44 A. D.), the grandson of Herod the Great, the Herod who "slew all the children of Bethlehem from two years old and under" at the time of the birth of Jesus. Herod Agrippa was educated at Rome and became a favorite of the Emperor Tiberius. This favor was lost when Agrippa unwisely remarked that he wished Tiberius would die. He was thrown into prison but Tiberius died shortly and Caligula, who succeeded him, released Agrippa, bestowed wealth upon him, and gave him certain provinces of Judea with the title of king. Later, under the Emperor Claudius, the whole of Judea came under his authority, Agrippa becoming thus one of the most powerful princes of the East. He was popular among the Jews because of his activity in opposing the growing sect of Christians. He it was who caused the Apostle James, the elder, to be beheaded, and who threw Peter into prison, as told in the book of Acts. Agrippa was a vain and superstitious man. The story runs that while in prison under the Emperor Tiberius he once observed an owl seated above his head. The omen was interpreted to portend his speedy release, which occurred. At the same time, however, he was warned that when this omen appeared again it would indicate that his death would occur within five days. While still at the height of his power and in the prime of life, he once appeared at the theater to meet the inhabitants of Tyre and Sidon who would sue for peace since the king had been displeased with them. Agrippa was arrayed in robes of dazzling silver tissue, and when, after his address, the people shouted, "It is the voice of a

god and not of man," he was elated. In the midst of his satisfaction, however, he glanced upward, beheld an owl seated above him, was overcome with terror and fell ill immediately. After five days of horrible suffering he died "eaten of worms" as we are told, Acts xii: 23.

Agrippa, Herod II (27-100 A. D.), a son of Agrippa, Herod I. He was at one time king of Chalais, but Claudius deprived him of his kingdom, giving him other provinces in its place. Although a Jew he was devoted to Rome and the Romans. This is the King Agrippa before whom the Apostle Paul was called to plead his cause, as recounted in Acts xxv: 26, and who said to Paul after his address, "Almost thou persuadest me to be a Christian."

Agrippa, Marcus Vipsanius (63-12 B. C.), a Roman general and statesman. He was of humble birth, but while little more than a boy became the chosen companion of Caius Octavius, the successor of Julius Caesar, known later by the title of Augustus. Agrippa commanded the Roman fleet in the battle of Actium, which made Octavius master of the Roman World. Agrippa was chosen aedile in 33 B. C. and during his tenure of office made many improvements in the city of Rome. The Pantheon, three of the most important aqueducts, and other public buildings were the work of Agrippa.

Ague. See MALARIA.

Aguinaldo, ä-gē-näl′dō, **Emilio** (1870-), a soldier and leader of the Filipino insurrections against Spain and the United States. He was born in the Philippines and educated at a private college. In 1896 he became mayor of Cavité, and took the part of leader in the rebellion arising that year. When the rebellion was put down he left the islands promising not to return, but after Admiral Dewey's victory in Manila Bay in 1898, Aguinaldo obtained the consent of the American authorities to return and set up a native administration under American protection. He re-commenced hostilities in January, 1899 by issuing a protest against American pretensions to sovereignty and calling upon Filipinos to continue their fight for liberty. He was defeated in battle, February 4, and, though fighting was continued for some time, it was with no better success. Aguinaldo was captured in 1901 by Gen. Frederick Funston and taken to Manila. Here he acknowledged the sovereignty of the United States and took the oath of allegiance.

Ahmes, ä′mēs. The earliest known manuscript on mathematics is that of Ahmes who lived 1700 B. C. He was an Egyptian scribe, and it is presumed that his *Directions for Obtaining Knowledge of All Dark Things* was copied from an earlier treatise, possibly several hundred years before. This manuscript shows that even at this early date the simple algebraic equation was known.

Ahriman, ä′ri-man. See MYTHOLOGY, PERSIAN; ZOROASTER.

Ainos, ī′nōz, a people living in the northern part of Japan, parts of Saghalin, the Kurile Islands, and the adjacent coast. There are perhaps 25,000 of them. As compared with the Japanese, they are a hairy, light skinned folk. Students are inclined to believe that they belong to the faraway white, or Caucasian, rather than to the Mongolian race. At one time they appear to have occupied all Japan. It is believed that many Ainos were absorbed by the Japanese in marriage, and this is one of the reasons why the Japs differ somewhat from the Chinese. The Ainos are short, broad-shouldered, and shaggy. They are intemperate. They hold festivals in honor of bears. A hedge on the east side of the hut and a mop-like stick with a bundle of shavings tied to one end are objects of reverence. They have a fund of entertaining folk-lore stories. They live in filthy, rude huts, and subsist chiefly by hunting, fishing, and trapping, or else they work for the Japanese. An Ainos village was one of the features of the Louisiana Purchase Exposition held at St. Louis. When requested to authorize an Ainos exhibit, the Japanese government consented only on condition that the natives be shown as an inferior, not a Japanese people. See SAKHALIN.

Air, the gaseous fluid which surrounds the earth. It is a mechanical mixture of

somewhat variable composition, consisting chiefly of nitrogen, oxygen, argon, water vapor, and carbon dioxide. If freed from water, carbon dioxide, and other minor constituents, air would contain by volume approximately 78 parts of nitrogen, 21 parts of oxygen, and 1 part of argon. If gases did not possess the property of diffusion the several constituents of air would arrange themselves in layers in the order of their densities. Thus, following an illustration given by Graham, there would be the following layers resting upon one another and covering the earth's surface. Next to the surface, five inches of water; next above, thirteen feet of carbon dioxide; then a layer of argon of about ninety yards thickness; above that, one mile of oxygen, and on the top about four miles of nitrogen. The amount of carbon dioxide in the air is small, being as a rule from three to four parts in ten thousand. It is produced from combustion and decaying of organic matter, and the respiration of animals. While the percentage amount of carbon dioxide is small, the total amount is quite large, it being estimated that over each acre of the earth's surface there are about 30 tons of the gas. Water vapor is the most variable constituent, due to the changing capacity of air for moisture at different temperatures and to the character of the earth's surface. When air contains all the moisture it can hold, it is said to be saturated.

Since nitrogenous animal and vegetable matters are constantly undergoing decay, traces of ammonia and ammonium compounds are always present in the air. In the neighborhood of factories, smelting-works, and of cities burning soft coal, there is a noticeable amount of sulphur acids, sometimes so considerable as to destroy vegetation. There also exists in the air suspended matter, consisting of fine volcanic dust, spores of molds and algae, small plant seeds, bacteria, soot, and finely pulverized earth. The dust and like impurities can be seen when a beam of sunlight finds its way into a room. On a larger scale, these impurities cause beautiful sunsets as well as disagreeable fogs. The theory has been advanced that fogs and clouds are to some extent the result of particles of condensed moisture adhering to the dust particles in the air. According to Tyndall, the blue color of the sky is due to the action of these particles on sunlight; above the atmosphere it is reasoned that the firmament appears inky black. Ozone, which is a condensed and more active form of oxygen, is found in very small quantity chiefly in pure air, such as country air and the air of the seaside.

Oxygen is the constituent of air most necessary to animal life. The average adult human being draws about one pint of air into his lungs at each breath, the oxygen being partly taken up by the blood and the remainder passed out in the exhalation. The inhaled oxygen combines with the venous blood in the lungs and oxidizes it. The oxygenated blood passes through the body and returns to the lungs charged with carbon dioxide, which gas is exhaled into the atmosphere. Here it follows that the respiration of animals affords a constant supply of carbon dioxide.

Carbon dioxide serves as a food for plants. Under the influence of sunlight the leaves of plants absorb the gas, which is decomposed within the plant tissues into carbon and oxygen. The oxygen not required by the plant is returned to the atmosphere, thus tending to maintain the conditions requisite for the life of animals. Air is also necessary for the germination of seeds. The presence of an ample supply of air in the soil is as indispensable to the life of upland plants as is that of water, and methods of tillage are adopted which facilitate soil breathing. The nitrogen of the air serves to dilute the oxygen, thus preventing too rapid oxidation or combustion. In an atmosphere containing a much larger proportion of oxygen, combustion would be more rapid and intense; if there were less oxygen, breathing would be more difficult, and fires would burn more slowly. In an atmosphere containing no oxygen there could be no combustion, no growth of animals, or even of plants. The office of argon is not yet understood.

Nitrogen is also a source from which is obtained plant nutriment. Certain plants,

legumes like clover, are able with the aid of bacteria to obtain their nitrogen direct from the air. Fertilizers are now made from air by means of electrical methods. This industry has assumed great importance in Norway where water power is abundant and affords a cheap source of electrical energy. The so-called Norwegian saltpeter is made at a factory at Notodden in the Hitterdal, Norway. This factory has been in operation since May, 1905, and is capable of turning out from 3,000 to 5,000 tons of nitrate per annum.

The atmosphere plays an important part in controlling the general temperature at the earth's surface. The direct rays from the sun passing toward the earth are considerably weakened by absorption on their way through the air. It has been estimated that a vertical ray passing through clear air reaches the earth with a loss of about one-fourth of its original intensity. The amount of radiant heat absorbed is all applied in raising the temperature of the air; the amount of heat transmitted is partly absorbed and partly radiated at the earth's surface. The heat radiated from the earth by day also aids in raising the temperature of the air. At night the earth cools and the air near it is cooled by radiation to the cooled surface. The greatest control of air temperatures by radiation takes place in the lower air, over the land, and in valleys. If the air becomes dusty, as in desert regions, or smoky, as in the neighborhood of forest fires, or cloudy, as in stormy weather, the lower strata are shielded from warming by day and from cooling by night. Under the dense fogs of London, hardly any perceptible rays from the sun reach the ground. In a certain sense the atmosphere acts as a blanket, absorbing and retaining heat and serving to lessen the extremes of temperature from day to night and from summer to winter. Professor Langley ventures the statement that, if we had no atmosphere, the noonday temperature in the midst of what is now at times the hottest part of Africa would not be above 328 degrees below zero Fahrenheit—a degree of cold almost inconceivable.

The air being a compressible fluid under the action of gravity does not lie in a layer of uniform density throughout, but diminishes rapidly in density from the surface upwards. The greater portion of the atmosphere is estimated to lie within four or five miles above the earth. At the sea level, air presses downward at the rate of about 14.7 pounds to the square inch, or, technically speaking, exerts a pressure of "one atmosphere." This slight density, while offering no resistance to the ordinary movements of men and animals, enables birds and insects to fly; and the motion of the air itself, in the form of wind, has been utilized by man from the earliest ages as the motive power for sailing vessels, driving windmills, and even propelling the land carriages that were the earliest forerunners of the modern automobile. The air is set in motion by solar heat. It is not only compressed by the pressure from above, but its elasticity causes it to press outward in all directions with equal force. This force buoys up and supports everything that is launched into the atmosphere, to the extent of the weight of air that it displaces, similar to the action of water in supporting anything placed in it. If a balloon filled with hot air or a gas lighter than air is released from the earth, it rises because the upward pressure or buoyancy is greater than the weight of the balloon; this principle is the basis of the science of aerial navigation. The elastic pressure of the air is measured by the barometer, and gradually decreases in the ascent from sea level. On the summit of Pike's Peak the air pressure is about 8.3 pounds to the square inch, and the atmosphere is estimated to extend to a height of from fifty to one hundred miles above the earth's surface. Aviators have attained notable altitudes, and the record was gained by Lieut. John A. MacReady, who rose to 40,800 feet.

One cubic foot of air at 32 degrees Fahrenheit, and under one atmosphere pressure, weighs about one and a quarter ounces; in other words, air is about 773 times lighter than water. Under a pressure of 39 atmospheres, and at a temperature of 220 degrees below zero, Fahrenheit, air is liquefied. Liquid air is very mobile and

has a bluish tint. It boils at about 310 degrees below zero. In spite of its low temperature liquid air can be poured upon the hand without danger; it does not even feel cold. The liquid may be frozen at a somewhat lower temperature, under which condition it looks like ordinary ice. Liquid air boils vigorously and changes rapidly to a gas. This tendency to change to a gas makes the liquid available for such purposes as running a motor. As compared with ordinary fuels, one great advantage is the small weight of the liquid required to perform a unit of work, but the cost of producing the liquid is a serious drawback. Nearly all liquid and gaseous bodies become solid when cooled in liquid air, and chemical changes are retarded or arrested. Cartridges made of granular charcoal and cotton waste, when saturated with liquid air, have been used as an explosive in mining. The largest liquid air factory in the world is near Munich, at which place as high as fifty quarts an hour have been produced.—JULIUS HORTVET.

Air-Brake, in railroading, a mechanical contrivance by which compressed air is used to stop railroad trains or to regulate their speed. In its simplest form an air-brake consists of four parts, a condensing air-pump, a train-pipe, a brake-cylinder, and a brake. The pump, which is located on the locomotive and is under control of the engineer, stores compressed air in a reservoir. The train-pipe runs back under the train. It is composed of car lengths coupled together to form one continuous pipe. The brake-cylinders, one under each car, are supplied with compressed air through the train-pipe. The piston of each brake-cylinder works a lever which, in turn, forces the brake-shoe against the wheel of the car. When the engineer desires to retard the motion of his train, he merely throws a lever and permits air to escape from the reservoir into the brake-cylinders, thus forcing the pistons and the brake-shoes to do their work. This simple form, known as the straight air-brake, was placed on trains by Mr. George Westinghouse in 1869. Mr. Westinghouse has devised numerous improvements. The different forms are known as the straight air-brake, the automatic air-brake, the quick action air-brake, and the high speed air-brake. The high speed form was devised about 1891. With the latest and most approved equipment an engineer can bring a heavy train running at full speed to a dead standstill within an incredibly short distance—"almost within the throw of a hat," as one writer puts it. Many serious accidents are thus avoided.

An important part of the mechanism of the modern air-brake is the triple valve, invented by George Westinghouse, the original inventor of the air-brake, to meet the requirements of heavy and high speed trains. This performs three functions. It charges the auxiliary reservoirs, applies the brakes to the wheels, and releases them; all these duties being performed automatically. The present quick action automatic air-brake is equipped with the quick action triple valve, which gives a high braking power in emergency applications and a lower but sufficient power in ordinary service applications. Every type of brake equipment on a locomotive can be used with any type of air-brake equipment on the cars in a train. Automatic air-brakes on the Westinghouse principle are also extensively used on street railway cars.

Air-Gun, an instrument resembling a rifle or shotgun, which discharges darts or bullets by the force of compressed air. It usually consists of an air chamber behind the barrel, with a contrivance on the principle of a pump for condensing air and forcing it into the air chamber, which acts as a reservoir. A valve operated by the trigger of the gun admits the compressed air into the barrel when a missile is to be projeetcd, and in some weapons of this kind the air pressure reaches 500 pounds to the square inch. The blow-pipe of South American and African natives is the original and simplest form of air-gun; its greatest development was a pneumatic gun invented by an officer of the United States army in 1886 for throwing projectiles filled with dynamite. The range of an ordinary air-gun is from 150 to 250 feet.

Air-Plants, plants that are not rooted in the ground, but are attached to the bark of other plants. They live in the air without earth or water, and derive their nourishment from the air. Doubtless these plants also draw food from the decaying wood and bark of the plants to which they are attached. They are to be distinguished from parasites which suck the sap of other plants. Strictly speaking, all mosses and lichens growing on the trunks of trees are air-plants. The Druid-like beards that reach to the bosoms of Longfellow's Acadian hemlocks, and the Spanish moss that drapes the forests in the swamps and along the shores of the Gulf States, are air-plants. The name is restricted, usually, to flowering plants, including a large number of showy orchids growing in moist, hot, shady localities like the forests of the Amazon and of India. See ORCHIDS; LICHENS.

Air-Pump, a device for exhausting, compressing, or transmitting air. In the exhausting form of air-pump, the receiver is connected by an air-tight passage with an air-tight cylinder. Each cylinder head, as well as the piston, is fitted with a delicate valve, all three valves opening upward or away from the receiver. When the piston, which we shall suppose to be at the upper or outer end of the cylinder, is pushed down, the air in the cylinder is forced through the piston valve. When the piston is drawn up, the air in the cylinder is forced out of the cylinder through the upper valve and cannot return, as in the attempt to do so it closes the valve. In the meantime the expansive force of the air in the receiver has opened the lower valve, and air has passed from the receiver into the cylinder. The air now in the cylinder is driven out by the next downward and upward stroke, and so on until the air in the receiver becomes too rare to open the lower valve. Other features not considered, the efficiency of an air-pump, that is to say, the perfection of the vacuum produced, depends on the delicacy, lightness, and fit of the lower valve.

An interesting problem can be made relative to the number of strokes required to form a theoretical vacuum. If we assume that there is no leakage and that the cylinder has, for illustration, a capacity 1/10 as great as that of the receiver, the first complete down and up stroke will remove the 1/11 part of the air, leaving 10/11 in the receiver. The second stroke removes 1/11 of this remainder, that is 1/11 of 10/11 or 10/121, leaving 100/121, and so on. So far as computation goes, a constantly diminishing remainder, but always a remainder, would be left in the receiver. Practically, a good pump will reduce the air to an inappreciable quantity.

A more perfect vacuum is obtained by connecting the receiver with a small upright tube through which globules of mercury are falling. Successive portions of air are carried away between the globules as they pass the point of connection. There being no valve to open, the air is carried away as long as there is any left to expand. It is claimed that, by this method, the air may be removed until only 1/420,000,000 of the original amount is left in the receiver.

Many interesting experiments are performed in the vacuum of a receiver. Water boils with very little heat when relieved from atmospheric pressure. A shriveled apple swells up and becomes plump with the expansion of the air within it. A lighted candle goes out for want of air to burn. A mouse dies for want of air to breathe.

The invention of the air-pump is credited to Otto von Guericke, a German physicist, about the year 1650. He was stimulated by the experiments of Galileo and Pascal. He was trying to produce a vacuum. He first attempted to pump the water out of a stout barrel, but found that air pressed in through the crevices. He then experimented by pumping water out of a copper globe. He soon found that, with a pump of sufficient delicacy and strength, a vacuum could be formed by pumping out the air directly.

The bicycle pump is a familiar example of a pump used for compressing air, and the vacuum cleaner of one for exhausting.

See PUMP; AIR.

Airship. The solution of the problem of flight was an American achievement. The first airplane to fly successfully was built by the Wright brothers of Dayton, Ohio. On December 17, 1903, Orville Wright flew several times in this machine, remaining in the air from 12 to 59 seconds at a time and covering a maximum distance of 852 feet, with an engine of only 16 horse-power. But it was five years later when the Wrights were finally recognized as successful inventors, and Wilbur Wright made many exhibition flights in Europe. The greatest speed of the first Wright machine was less than 35 miles an hour, while twenty years later there were airplanes fitted with engines of over 1,500 horse-power, capable of speeds of more than 200 miles an hour. Within that period airplane flights were made across the Atlantic and from Europe to South Africa and even Australia. The first of these notable flights was that of two Englishmen, Alcock and Brown, across the Atlantic in 1919, when they made a non-stop flight in a Vickers-Vimy machine in 15 hrs. 57 min. In the same year Lieut.-Commander Read, U. S. N., in a navy hydroplane, or airplane equipped with pontoons for supporting it in water, also succeeded in crossing the Atlantic; distance, 4,250 miles; time, 53 hrs. 34 min. Other great flights followed, the science of aviation in craft heavier than air having been immensely stimulated by the fighting and scouting experiences during the World War.

Modern airplanes are capable of remarkable performances. They can carry loads of more than 25 tons, cover immense distances regularly without stopping, and rise to heights above the highest mountains. Every day they fly from one end of Europe to the other, carrying passengers and freight with safety in all kinds of weather except fog, which makes it difficult to land in safe spots; and in the United States a number of commercial routes have been established, while the U. S. mails are freely transported from the Atlantic coast to the Pacific along routes that give all the principal cities a regular daily air-mail service. Commercial airplanes are usually equipped with both wireless telephone and wireless telegraph apparatus. The aerial wire is kept rolled up on a drum, and is paid out by the pilot when it is necessary to send or to receive a message. Electric current is obtained from a generator, driven by the air rushing past the airplane, and speech can be transmitted for 50 miles or more. By this means the pilot can be kept informed of his whereabouts in the heaviest fog, and may even be directed to a safe landing. To overcome the great noise of the airplane motor, the pilot or observer wears a helmet, with telephone receivers fitting over his ears in rubber cups. It is believed to be quite possible that aircraft will ultimately be controlled entirely by wireless from the ground, and that even motive power may be conveyed by the same means from ground stations to airplanes in flight.

Airplanes are of varying types, known chiefly by the number of their wings, or sets of planes, as a monoplane, biplane, triplane, etc. The planes are curved slightly, with the apex of the curve near the front edge of each plane. In flight the wings are slightly tilted to secure the pressure of the wind on the lower surface, which causes the "lift." An internal combustion engine, similar in principle to the motor of an automobile, is used to drive the large wooden propeller, or air-screw, which either pulls or pushes the wings through the air and thus secures the air pressure below and suction above which result in "lift."

Airplane control is simple, consisting mainly of two levers operated by the pilot. An upright lever, commonly called the "joystick," works the horizontal rudder or elevator and also the ailerons or hinged wing-tips. The other lever is a rudder-bar, operated by the pilot's feet, and works the vertical rudder. Both rudders are carried on a framework at the rear of the plane. In addition to these working levers there are the usual switch, ignition, and throttle controls for the gasoline engine. In starting, the airplane is run along the ground for some distance, gathering speed, and is then caused to rise against the wind by inclining the elevator with the joystick.

At any desired height a movement of the lever causes the airplane to straighten out and fly on an even keel. For turning in either direction, right or left, the rudder-bar is moved, and the wing-tips are tilted slightly by a similar movement of the upright lever. In landing, the engine is shut off and the airplane glides downward in any direction desired, but is always brought to earth against the wind. Many acrobatic stunts are performed by experienced pilots, such as looping, spinning, and side-slipping. Looping, which appears to the uninitiated to be a sensational and dangerous performance, is in reality a simple stunt and is the first to be learned by pupils. Thousands of young Americans were trained as airplane pilots during the world war period and were ready for active service abroad when the armistice came in November, 1918, while many others served with the army in France, in bombing, scouting, and combat machines.

The record for highest altitude attained by airplane is held by Lieut. John A. MacReady, U. S. A., who at McCook field, Dayton, Ohio, Sept. 23, 1921, rose to a height of 40,800 feet. The world's record for speed is held by Brig.-Gen. William Mitchell, U. S. A., who flew at Mt. Clemens, Mich., Oct. 18, 1922, at an average speed of 224.05 miles an hour in four heats over a one-kilometer course. An unofficial record of 248.5 miles an hour was made by Lieut. Maughan Oct. 14, 1922.

The world record for sustained flight by airplane was established Oct. 5-6, 1922, by Lieuts. John A. MacReady and Oakley Kelly, U. S. A., who circled in a large monoplane over San Diego, Cal., for 35 hrs. 18 min. 30 sec., without making a landing. The same aviators on Nov. 3-4, 1922, attempted to fly from San Diego to New York without a stop, but were compelled to land in Indiana after covering a distance of 2,060 miles, owing to a defect in the water supply. On Sept. 5-6, 1922, Lieut. James H. Doolittle, U. S. A., flew from Jacksonville, Fla., to San Diego, Cal., a distance of 2,275 miles, in 21 hrs. 18 min., with only one stop at San Antonio, Tex., for fuel.

Gliding flights, in airplanes without engines, were an interesting development of aviation in 1922. The machines were started by man or horse power from the tops of hills and remained in the air for a considerable time, even rising to a height above that of the start. German airmen made some very successful flights in this manner, but the record of the year was made by M. Maneyrolle, a French airman, who kept a monoplane in the air at Firle, England, Oct. 21, 1922, for 3 hrs. 22 min.

Turning now to airships proper, that is, dirigible balloons or lighter-than-air machines, it may be noted that Germany led the way in their construction and development prior to the great war, but Britain now has the largest fleet and biggest vessels of this kind. One of these, fitted up for passenger transport, has accommodations for 50 passengers in addition to a crew of 27. Sleeping bunks of folding or Pullman type are provided for travelers, while the dining-room and cabin afford every possible comfort during the day. An airship of this type is capable of traveling from England to Australia, with stops at important places on the way, in less than two weeks. The British dirigible R-34, which crossed the Atlantic from east to west and again from west to east in July, 1919, holds the record for the longest non-stop flight by a vessel of that type, its record being more than 3,200 miles. The return trip from New York was made in 75 hours.

There are three main types of dirigibles, namely, non-rigid, semi-rigid, and rigid. The first consists of a balloon envelope with a car attached. In the second, the envelope is strengthened with girders, of aluminum or an aluminum alloy; and the third type consists of a framework of metal girders, with a series of gas-bags inside, attached to a rigid metal keel from which are suspended the cabins for passengers and gondolas for the engines. This latter type includes the Zeppelins and the British and American types, which are copies of Zeppelins. A typical craft has a length of 639 feet and a diameter of 79 feet. The hull is built up with girders of light alloy metal and has a triangular keel

which forms the main corridor of the ship and contains water, ballast, and gasoline tanks, stowage room for freight, and quarters for the crew. Inside the hull are 19 gas-bags, charged with approximately 2,000,000 cubic feet of hydrogen or helium. A gondola suspended near the forward end of the keel carries one of the engines and the control apparatus. Two smaller gondolas are suspended side by side amidships, each carrying an engine, and near the rear of the keel a larger car is suspended, with two engines and an auxiliary control system. The rudders and elevating apparatus are at the extreme rear. Such a craft is capable of a wide range of travel, and may be used for the transportation of passengers, mail, and freight over long-distance routes, the chief difficulty being to find suitable housing, when the dirigibles are at rest. This is being overcome by the erection of mooring masts, with elevators for the accommodation of passengers, the ships being moored to the top of the mast, which consists of a latticework tower with a revolving top that permits the vessel to swing with her nose up wind. A shed to house such a vessel would cost at least half a million dollars, whereas a suitable mooring mast can be erected for about one-quarter of that amount. It also requires hundreds of men to berth one of these monster airships in a shed, or bring it out for flight, while half a dozen men can moor it safely to a mast and release it for service. See ZEPPELIN; BALLOON.

Airy, Sir George Biddell (1801-1892), an English astronomer, born in Alnwick, England. He graduated from Cambridge in 1823. He held many important positions, among them being: professor of mathematics at Cambridge, and director of the Greenwich Observatory. His work was varied in character, and he wrote several books on various subjects, among them being *Mathematical Tracts, Treatise of Sound, Treatise on Magnetism,* and articles on historical and scientific subjects.

Aix-la-Chapelle. SEE AACHEN.

Ajax, ā′jaks, in Greek legend, a hero of the Trojan War. He was a cousin of Achilles. At his birth Hercules wrapped him in a lion's skin, making him invulnerable to the arrows of his enemies, except in the armpit. He is represented in Homer's *Iliad* as of colossal strength, "as unmoved by the shafts of his enemies as is an ass in a cornfield by the pelting of boys." Although noted for his size, strength, and courage, he was dull of intellect and slow of speech. During the siege of Troy he was a constant terror to the Trojans. Time and again he encountered Hector in single combat and came off victorious. He was accounted second only to the great Achilles. When Achilles was slain, his mother, Thetis, directed that his armor be given to him who was most deserving. Ulysses and Ajax were the two claimants for the prize. Ulyssses received it. In his despair Ajax lost his reason. He slew the sheep of the Greeks, believing them to be men and enemies. Realizing what he had done, shame drove him to suicide. Where his blood sank into the earth, there sprang up a flower which bore on its leaves the first two letters of Ajax's name, AI, which is also a Greek exclamation signifying "woe." This flower was the hyacinth. A similar story was told of a youth, Hyacinthus.

Many stories are told in the *Iliad* of the exploits of Ajax, of his strength and prowess. Perhaps the best known is the incident of his struggle to protect the dead body of Patroclus from Hector, because it is at this time that Ajax utters his famous prayer for light. Zeus has enveloped the scene of battle with clouds and darkness, and Ajax exclaims:

> Lord of earth and air!
> Oh, king! oh, father! hear my humble prayer!
> Dispel this cloud, the light of heaven restore;
> Give me to see and Ajax asks no more;
> If Greece must perish we thy will obey,
> But let us perish in the face of day.

This prayer is often quoted and alluded to in literature. In Longfellow's poem, *The Goblet of Life,* occurs the line,

> The prayer of Ajax was for light.

Akbar, äk′bär (1542-1605), an emperor of Hindustan, one of the best and most famous of modern Asiatic rulers. His father, deprived of his empire by usurpers, lived in exile for twelve years, recovering his throne only a year before

his death. Akbar was but fourteen years of age at this time and for four years ruled under a regent minister. With the power in his own hands he soon added to the few provinces then subject to the throne of Delhi, the whole of Hindustan north of the Deccan. He ruled with wisdom and justice, showing talent in organizing his vast dominions. Akbar had his territories accurately surveyed and statistics taken in order that taxes might be adjusted with fairness. He constructed roads, introduced a police system, and established a uniform system of weights and measures. He forbade child marriage, permitted widows to marry, and endeavored to put an end to the practice of burning widows on the graves of their husbands. He punished intoxication, though he permitted the use of wine. He was fond of religious inquiry, even attempting to found a new religion based on his own ideas. He established schools for both Hindus and Mohammedans, and did much to encourage the advance of literature. Akbar's later years were embittered by the death of two sons and the disloyalty of a third, who was suspected of being instrumental in his father's death. See INDIA.

Ak'ron, a manufacturing city of Ohio, the county seat of Summit County. It is situated on the Ohio Canal, thirty-five miles south of Cleveland. The Little Cuyahoga River furnishes water power. Natural gas is found and there are coal mines in the vicinity. The industries of Akron include one of the world's largest match factories, and more rubber tire and general rubber goods factories than any other city in the world. There are also manufactories of flour and cereals, hoisting and mining machinery, farm implements, furnaces, pottery and sewer pipe. Among the educational institutions are Buchtel College, a library, and fine public schools. Akron is about five hundred feet above Lake Erie. There are many small lakes in the vicinity, and as the city is on the Baltimore & Ohio, the Erie, and other railroads, and is traversed by electric railways, the lakes are easy of access and the district is popular as a summer resort. The population of Akron by the census of 1920 was 208,435.

Aktaeon, ăk-tē'on, in Greek legend, a son of King Cadmus. See DIANA.

Alabama, one of the Gulf States. It is bounded landward by Mississippi, Tennessee, Georgia, and Florida. A western extension of Florida occupies three-fourths of Alabama's natural seacoast. The general shape of the state is oblong with an extreme length of 336 miles. Greatest width, 200 miles. Area, 52,250 square miles. The Tennessee River flows across the northern part of Alabama, and is a part of the drainage system of the Mississippi River. With this exception the waters of Alabama flow directly into the Gulf. The system of naming rivers, inherited from the Indians, is peculiar and a little confusing. Instead of one name for the main stream throughout its course we find, for instance, that the Etowa and the Oostenaula form the Coosa; the Coosa and the Tallapoosa—the names once mastered are quite musical—form the Alabama; the Alabama and the Tombigbee form the Mobile, forty-five miles long. The state has fine waterways. Steamboats ascend the Alabama and its largest tributary to a distance of 800 miles. The Tombigbee River is navigable for 500 miles.

CLIMATE. The highest point in the state is 2,407 feet above sea level. The healthfulness of the climate increases with the altitude. The upland towns have acquired no little reputation as winter resorts for northern invalids. Temperature varies with season and elevation. The limits of winter temperature are placed at 18 degrees and 82 degrees Fahrenheit. In summer the thermometer ranges from 60 degrees to 105 degrees.

AGRICULTURE. The surface may be divided roughly into four agricultural belts of unequal and varying width, crossing the state from east to west. The most northerly, a region of cereals and fruits, follows the sweep of the Tennessee. It is a country of red clay and heavy timber —oak, poplar, chestnut, hickory, and elm. Oats, corn, wheat, clover, and timothy thrive. Fruits, both orchard and small fruits, including apples, pears, and especially peaches, do well. This is the nursery section of the state. Between 200 and 300 cars of nursery stock, including

a large number of young apple trees, and large shipments of roses and other ornamental shrubs, are sent out each year from Huntsville.

MINERALS. The mineral region occupies the northeastern part of the state, extending southward to Columbus, Ga. Extensive deposits of iron and coal occur in this section and here mining is the most important industry. Alabama is the third state in the production of iron ore, being exceeded by Minnesota and Michigan, the annual output exceeding 6,000,000 long tons. The state ranks seventh in the production of bituminous coal with an annual output of about 17,000,000 tons. Graphite is found in large quantities and it is estimated that Alabama furnished over 60 per cent of the domestic graphite used in the World War.

MANUFACTURES. The development of mining and related manufactures has been rapid since 1900. The coal and iron ore are in close proximity so that the ore is converted into pig iron and steel with only a slight expense for transportation. Birmingham is the chief center of this industry and one of the leading iron-producing centers of the country. About one-third the coal is made into coke and Alabama ranks second in the production of this commodity. The manufacture of lumber and lumber products is considered the leading industry. During the World War shipbuilding at Mobile and Chickasaw received an impetus that extended to 1920. There has been a marked development of hydro-electric power, which is employed for lighting and manufacturing purposes.

TRANSPORTATION. The state is traversed by approximately 6,000 miles of railways. The chief lines include the Mobile and Ohio, the Southern, the Louisville and Nashville, the Seaboard Air Line, the Atlantic Coast Line, the Central of Georgia and the Frisco lines. Birmingham, Montgomery and Mobile, are the chief railroad centers. The Tombigbee and the Warrior rivers have been canalized and afford water transportation from the center of the mining district to tidewater at Mobile. Government self-propelling barges now make their way down the Mississippi to New Orleans thence through the Gulf to Mobile, and up these rivers to Birmingham, and Cordova, in the heart of the Alabama coal fields. Private owned barges carry a heavy tonnage of lumber, coal and iron and steel products.

POPULATION. According to the census of 1920 Alabama had 2,347,295 inhabitants, distributed among races as follows: whites, 1,447,032; Negroes, 900,652; Indians, 405; all others 85. Over two-thirds the population is rural. The following cities have over 10,000 inhabitants: Birmingham, 178,606; Mobile, 60,777; Montgomery, 43,464; Bessemer, 18,674; Anniston, 17,734; Selma, 15,589; Gadsden, 14,734; Tuscaloosa, 11,996.

EDUCATION. The present school system dates from the adoption of the new constitution in 1875. There is a permanent school fund derived chiefly from a 3 mill state tax and a sale of school lands set apart by Congress. There is also a system of county and district taxation for school purposes. Between 1907 and 1911 a system of county high schools with liberal appropriations was established. In 1919, at the invitation of a state school commission, the United States Bureau of Education made a survey of the educational system of the state. This was followed by the enactment by the Legislature of the School Code of Alabama which provided for a school council of education for the purpose of co-ordinating the efforts of the University of Alabama at Tuscaloosa, the Alabama Polytechnic Institute at Auburn, and the Alabama Technical Institute and College for Women at Montevallo by assigning to each special lines of work in higher education. The public school system is gaining in efficiency from year to year and illiteracy is decreasing.

There are normal schools for whites and negroes and schools for the deaf, dumb and blind. An agricultural school is also maintained in each congressional district. Among the institutions maintained by religious denominations are Saint Bernard College at Saint Bernard and Spring Hill College at Spring Hill (both Roman Catholic); Birmingham-Southern College at Birmingham (Methodist Epis-

copal, South); The Woman's College of Alabama (Methodist Episcopal, South), Montgomery; Judson College for Women at Marion and Howard College for Men at East Lake (Baptist). Tuskegee Normal and Industrial Institute is described under its title.

GOVERNMENT. The Constitution now in force was adopted in 1901. The executive department consists of a governor, lieutenant governor, attorney-general, secretary of state, state auditor, state treasurer, commissioner of agriculture and industries, and superintendent of education. Each is elected by popular vote for four years. None of these officers is eligible for re-election and the governor is not eligible by appointment or election to any office in the state or to the United States Senate during his term of office or within one year after its expiration.

The legislature consists of two houses—a senate and house of representatives, the members of each being elected for four years. The number of senators cannot exceed one-third the number of representatives. The governor has the power of veto but the legislature may pass a bill over his veto by two-thirds majority. The county is the unit for local government.

Suffrage is restricted to those who can read or write any article of the Constitution of the United States, and have worked or been regularly employed in some occupation for the greater part of the year preceding registration, or who own and have paid taxes on property valued at $300 or more. Those who have served in the army or navy of the United States or the Confederate States of America, and those who are physically unable to read or write are exempt from these qualifications.

HISTORY. The first white people to visit the state were doubtless the Spaniards under De Soto. They found a courageous Indian tribe well settled in permanent villages. The house of one chief is said to have been one hundred and twenty feet in length, and a temple or council house on the Savannah was as large. Mobile was fortified by the French in 1702 and was occupied by a settlement in 1711. It was the capital of Louisiana for fifteen years. When the country came into possession of the United States, Alabama was regarded as a part of Georgia and then as a part of the newly organized territory of Mississippi. In 1813 General Jackson punished the Creek Indians severely in the Horse Shoe Bend of the Tallapoosa. In 1817 Alabama was organized as a territory, and was admitted to the Union with its present boundaries in 1819. In 1847 the capital was permanently located at Montgomery.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	51,279
Water area, square miles	719
Forest area, acres	20,000,000
Population (1920)	2,347,295
White	1,447,032
Negro	901,142
Foreign born	17,662
Chief Cities:	
Birmingham	178,270
Mobile	60,777
Montgomery	43,464
Bessemer	18,674
Anniston	17,734
Number of counties	67
Members of state senate	35
Members of house of representatives	106
Salary of Governor	$7,500
Representatives in Congress	10
Assessed valuation of property	$675,162,002
Bonded indebtedness	$15,351,702
Farm area, acres	19,576,856
Improved land, acres	9,893,404
Cotton, bales (500 lb.)	635,000
Corn, bushels	62,651,000
Wheat, bushels	210,000
Oats, bushels	6,776,000
Potatoes, bushels	2,400,000
Tobacco, pounds	1,500,000
Domestic Animals:	
Horses	158,000
Mules	322,000
Milk cows	507,000
Other cattle	791,000
Sheep	123,000
Swine	1,861,000
Manufacturing establishments	3,654
Capital invested	$455,592,733
Operatives	107,159
Raw material used	$300.664,290
Output of manufactures	$492,730,895
Coal mined, tons	19,184,962
Iron ore mined, tons	6,121,087
Pig iron output, tons	2,654,179
Miles of railway	5,376
Teachers in public schools	12,517
Pupils enrolled	568,294

Alabama, The, a famous privateer of the Confederate States. The Alabama was a wooden steam-sloop built for the Confederacy at Birkenhead near Liverpool, England. The English government was warned by the United States minister, Charles Francis Adams, that a suspicious sloop, known in the shipyard as No. 290, was being fitted with port holes and heavy guns, and that circumstances indicated its being built for a privateer. In July, 1862, the sloop steamed out of the Mersey on an alleged trial trip. Once outside, it was provided with an armament of cannon and a supply of military stores. Captain Raphael Semmes, an able seaman, took command with a crew of eighty British sailors, and at once began the capture of American merchant ships. Owing to the blockade of the American coast, the Alabama was never able to enter a Confederate harbor, but she captured and sold or sank sixty-five vessels valued at $6,000,000, before she was run to harbor at Cherbourg, France, and sunk. At the close of the Civil War the United States presented to the British government a claim for damages, known as the "Alabama Claims." In 1871 the matter was referred to an arbitration tribunal composed of five members. The tribunal sat at Geneva, and awarded the United States $15,500,000 with which to pay the owners of the vessels destroyed.

Alabaster, a fine-grained, soft form of gypsum. It occurs in various colors, as red, yellow, and gray; but the traditional alabaster is snowy white. When first quarried it is so soft that it may be cut with a knife or shaped on a lathe, but on exposure to the air it hardens, until it is like marble. It has long been used for artistic purposes. Priceless alabaster vases, statues, ointment boxes, and even columns, remnants of the days of Roman splendor, are still to be found in art museums. Alabaster cement was used by artists to close the joints in marble work and in making casts. Egypt was celebrated for alabaster; the swathed remains of the wealthy Egyptians were laid away not infrequently in a sarcophagus of this material. Sir John Sloane of London paid $10,000 for a fine specimen covered with hieroglyphics. Alabaster quarries are found in many parts of Europe. The alabaster of Florence, Italy, long the art center of the world, is especially pure in color and fine of grain. Oriental alabaster is a stone found in caverns, and is formed chiefly of lime, like the stalagmites and stalactites of Mammoth Cave. It is a translucent stone, somewhat like onyx, and of a milky white or yellowish color.

Aladdin, à-lăd′in, the hero of the story of *Aladdin and the Wonderful Lamp,* in *The Arabian Nights' Entertainments.* Aladdin is a poor boy in China who becomes possessed of a magic lamp. If he rubs it, a powerful jinnee or spirit appears, who is entirely at the service of him who owns the lamp. Aladdin becomes rich through the aid of his lamp. He wins a princess for his wife. He has a palace built for her in a single night, but one window is left unfinished which no one can complete to match the others. At last the original owner of the lamp attempts to regain it by offering to exchange new lamps for old. Aladdin's mother sells the magic lamp, and various troubles ensue. Aladdin finally recovers it, kills the first owner, moves his palace to Cathay, and, to crown all, becomes sultan.

Many proverbial sayings have arisen from the story of Aladdin. "To finish Aladdin's window," means to complete what has been begun by some more capable person. "To exchange old lamps for new," is an allusion to the mother's giving away the rusty magic lamp for a new and useless one. Aladdin's lamp is mentioned frequently in literature. Sometimes the expression is used figuratively for the imagination, thus Lowell:

> When I was a beggarly boy,
> And lived in a cellar damp,
> I had not a friend nor a toy,
> But I had Aladdin's lamp;
> When I could not sleep for cold,
> I had fire enough in my brain,
> And builded, with roofs of gold,
> My beautiful castles in Spain!

Alamo, ä′lä-mō, a fort at San Antonio, Texas. It was originally a mission house of the Franciscan fathers, built about 1722. An open, oblong space of two and

one-half acres, containing the buildings of the mission, was inclosed by a wall eight feet high and thirty-three inches in thickness. The outer wall, being of adobe, has fallen; but the inner buildings still stand and they bear appropriate inscriptions. The Alamo is noted in the war of Texan independence. Santa Anna, with an army variously estimated at from 1,500 to 4,000 Mexicans, besieged a band of 140 Texans, among whom were Colonels David Crockett and James Bowie. The Texans held the fort for two weeks. When finally taken by assault, March 6, 1836, only six men remained alive. They were immediately butchered by order of Santa Anna. During the remainder of the war, "Remember the Alamo!" became the Texan war cry. See SANTA ANNA; CROCKETT.

Aland Islands, a group of islands numbering about three hundred, lying at the entrance of the Gulf of Bothnia. The islands take their name from the largest of the group. Their total area is about 550 square miles. The islands originally belonged to Sweden, but were lost to Russia in 1809. Russia held them until 1918, when they were occupied by Germany; but she was forced to evacuate after the signing of the armistice. The importance of the Aland group from a military point of view has been the cause of the various quarrels waged over it. Russia erected fortifications here in the reign of Nicholas I, but they were destroyed by Anglo-French forces in 1854. After the outbreak of the World War, Russia again fortified the islands, 1915. Sweden protested against this move by the Russians, who insisted that the forts were only temporary. After the Russian revolution of 1917, however, attention turned toward the larger question of the sovereignty of the islands. The plebiscite of December, 1917, indicated that the Alanders, who are largely of Swedish descent, were highly favorable to reunion with Sweden. By the treaty of Brest Litovsk and the treaty between Germany and Finland, the fortifications were ordered removed; but the Bolsheviki delayed the removal. The Finnish government opposed the union of the Alands to Sweden, and proposed to make of the islands a separate Finnish province, passing a bill to that effect in 1920. Thereupon, the Alanders appealed to Great Britain, France, Italy and the United States for protection of their right of self determination. The case was later referred to the Peace Conference; the Conference refused to consider the case, and passed it on to the League of Nations. Finland, meantime, was protesting that the whole Aland question was domestic, and that the League was not competent to intervene in Finnish affairs. The committee appointed by the League of Nations to investigate the Aland problem reported in June, 1921; and in the same month the Council decided that the islands were to belong to Finland; that they were to have full autonomy; and that from the military angle they were to be neutralized.

Alaric, ăl'a-rĭk (376?-410), king of the Visigoths. The name is from the Gothic *al reiks,* all ruler. The date of his birth is uncertain, but Alaric was born on the island of Peuce in the Danube. He belonged to a princely family, members of a Gothic horde in the Danubian provinces of the Roman Empire. In 394 we find Alaric, at the head of a body of Gothic auxiliaries, employed by Emperor Theodosius the Great in putting down a revolt at the head of the Adriatic, in what is now Austrian territory.

Theodosius, dying, left his empire to be ruled jointly by his two sons—Arcadius to rule the east at Constantinople; Honorius to rule the west at Ravenna. Both were weak. Alaric was declared king of the Visigoths and threw off allegiance to the empire. He began a series of invasions. He entered Greece in 396, but was met by Stilicho, a huge Vandal in the service of Honorius, and was compelled to withdraw. Seemingly to keep him still, Alaric was made prefect of a large district on the Danube.

In 400 Alaric appeared in Northern Italy at the head of a large force, but was defeated again by Stilicho.

It is not known to what extent Alaric was influenced by Christianity and by civilization. He was a leader of ability and ambition. He taught the hordes of

Europe the road to Rome, and paved the way for subsequent invasions.

See GOTHS; STILICHO.

Alaska, a territory of the United States, occupying the northwest corner of North America. The name is Indian, signifying a great land. The central portion is a vast rectangle situated between the North Pacific and the Arctic Oceans, and extending from Bering Sea to the 141st degree of west longitude. A long strip of coast follows the Pacific 500 miles to the southeast, and an arc of islands 1,000 miles long tails off into the southwest, almost to Kamchatka. If, as suggested by Mr. Brooks, of the United States Geological Survey, a map of Alaska be laid on a diagram of the United States, the southeast extremity of the coast strip will fall near Atlanta, Georgia, and the tip of the Aleutian Islands will fall at San Francisco; while the main part of the territory fills a quadrangle extending from Oklahoma to Lake of the Woods, and from Chicago to the eastern border of Colorado. From Sitka to the mouth of the Yukon River is a sea voyage of 2,000 miles.

TOPOGRAPHY. The area of Alaska, according to latest surveys, is 586,400 sq. m. It is not easy to characterize the surface of so vast a region in a few words. The Arctic coast is a tundra region of swamps and mossy moors. It is terminated at the west by a mountainous region, situated between Pt. Barrow, the most northerly point of the continent, and the wide marshes of the lower Yukon. This tundra region, like that of Asia, is frozen to a great depth. Each summer the surface thaws out to a depth of two or three feet only. South of this Arctic coast plain lies a vast interior prairie and forest region large enough for several states. It is drained chiefly by the Yukon, one of the great rivers of the world, which gathers the waters of northwestern British America and sweeps westward in a flood to Bering Sea. Six hundred miles above its mouth it is a mile in width. It is ice bound during a large part of the year, but during a short summer it is navigated by no less than forty steamboats, trading with the mining camps on its upper waters. Extensive tracts are described as well timbered; others as covered with rich grasses and beautiful flowers.

The Aleutian Islands are of little importance. They coast the deep basin of the Pacific for a distance of a thousand miles, dividing it from Bering Sea. Over sixty of these islands are of recent and volcanic origin. Ten of these volcanoes are still active. The islands are inhabited by Aleut Indians who live chiefly by hunting and fishing. They are almost treeless, but are well covered with grass and shrubs. These islands are exceedingly interesting to naturalists. Many of the flowers, birds, and animals are not found elsewhere. Close to the Alaskan mainland, there is a large wooded island called Kadiac, especially noted for the Kadiac fox and bear. The latter is a sort of brown bear, resembling in some respects the grizzly. It is not only the largest and most powerful member of the bear family, but it is also the largest flesh-eating animal known.

From Kadiac eastward to Mount St. Elias, the coast grows more and more mountainous. The great angle of the Pacific coast is one of the scenic regions of the world. The North American continent attains its greatest height in this region. There are mountains twice as high as the Alps, and glaciers beside which those of Switzerland are mere driblets. Stretching northward from Cross Sound, a stupendous range follows the sea. Peak after peak seems to rise from the very ocean. Crillon, Fairweather, Vancouver, Cook, and other mighty fellows, there they stand. Old Mt. St. Elias, the landmark of the sailor, looms up 18,024 feet. Mt. Logan in the background carries a snow cloak and cap 19,550 feet high. Even in midsummer, the region of perpetual snow is only 2,000 feet above the sea. Behind the mountains mentioned, a second range, a continuation of the familiar Cascade Mountains of the Pacific coast, trends northwest and terminates in an elevated region called the Alaskan Mountains. Mt. McKinley, the central peak, is 20,460 feet high. It is not only the highest mountain

in Alaska, but the highest peak in North America. Far out at sea, these elevated snow fields, surmounted by lofty peaks, look like fleecy clouds on the distant horizon; but viewed more clearly as the ship approaches, they form a scene of awe-inspiring, solitary grandeur. As the tourist realizes the magnitude of the rock masses that underlie this glittering waste of snow, and the irresistible nature of the forces that crumpled and heaved them there, he realizes that his steamer is but a nutshell bobbing on the sea.

During geologic ages, the coast line has sunk until the sea now washes the mountain walls. Glaciers have worn gorges and deep inlets like the fiords of Norway. If we except the ice caps of the polar regions, the greatest glaciers in the world are here. Each bay, arm, and inlet receives its stream of ice. Glacier Bay receives the wonderful Muir Glacier. The face of this glacier is a perpendicular wall of ice two hundred feet high and three miles wide; and yet it is a mere rivulet compared with others. At the head of Lynn Canal two hundred miles inland we find Skagway, Dyea, the White Pass, and Chilkoot Pass, famous as marking the beginning of the overland journey to Dawson and the Klondike. South of Lynn Canal the seacoast is clothed with magnificent forests of pine, cedar, fir, and spruce, a continuation of the coast forests of Washington and of British Columbia.

History. Alaskan waters were explored for Russia by Vitus Bering in 1728, and for England by Captain Cook in 1776. The Russians organized fur and trading companies with posts at Kadiac Island and elsewhere. They also established numerous missions among the natives; but the early history of Alaska centers at the interesting old town of Sitka. It is situated on an island near the entrance to Lynn Harbor. In early days, before San Francisco was thought of, the Russian-American Fur Company aimed to build here a commercial and manufacturing city. Iron, coal, and copper were mined. Bricks were burned. Bells were cast. The indolent Spanish of southern California bought their plow shares, hoes, and hatchets from Sitka makers. The first steamships built on the Pacific slid into its waters from the shipyards of Sitka; the first foundries and machine shops on the American shore of the Pacific were here. The first miners, the "forty-niners," that rushed to California to find gold, bought woolen clothing, picks, shovels, lumber, dried fish, and woodenware produced at Sitka. The company aimed to build up a trade between Alaska and China and Japan, but lost money in the long run.

Sitka declined. During the Civil War Russia was at some pains and considerable expense to send war vessels to our Atlantic border on a friendly visit at a time when we were heartily glad to shake the Russian bear by the paw. There seemed just a chance that England might take a hand in our local quarrel, and we were glad to have a strong neighbor on our side. At the close of the war Secretary of State Seward, with the consent of Congress, took Alaska off Russia's hands for $7,200,000. This was supposed to be more than a liberal price, indeed to be a squaring of accounts. The American flag was hoisted at Sitka, October 18, 1867.

Gold Discoveries. The discovery of gold in the Yukon Valley in 1896-7, and at Cape Nome two years later, attracted an immense horde of gold seekers. A territorial government was set up in 1900, and Sitka was made the capital. In 1905 the capital was removed to Nome, but in 1906 Juneau was made the capital. In 1903 the Alaskan Boundary Commission met in London to establish the boundary line between Alaska and Canada. The district about the head of Lynn Canal, the chief object of contention, was awarded the American claimants. In 1904 Sitka was united with Seattle by an ocean cable.

Alaskan gold was found, first of all, in the region about Lynn Canal. Prospectors soon located the precious metal in the valley of the upper Yukon, where the Canadian city of Dawson now stands. A stampede for the gold fields set in. In the summer seasons miners went up the Yukon River with their outfits. In the winter they landed their pack horses, mining tools, and supplies at Skagway, a

new town at the head of the Lynn Canal. The only way of reaching the interior lay through mountain passes above the snow line. Both men and beasts of burden endured incredible hardships in effecting a passage and many lives were lost. In 1899 a railway of 112 miles was constructed. To give some idea of the mighty struggle that went on here, it is sufficient to say that the builders of the railway were obliged to remove the frozen bodies of over 2,000 pack horses before they could grade through White Horse Pass.

Cities. The grand tour of Alaska may now be made in comparative comfort. Passengers land from the Pacific steamers at Skagway. They go by rail from Skagway to White Horse. They are then conveyed, in summer by steamer, in winter by four-horse sleighs, to Dawson, a distance of three hundred and thirty miles. Geographically Dawson is a Canadian city; commercially it is a part of Alaska. It is now by no means a rude mining camp. With the wealth derived from gold mining, a well-built city has sprung up. Electric lights, expensive waterworks, churches, theaters, club houses, banks, hotels, a postoffice, public schools, and elegant houses are in keeping with the means and liberality of a city assessed at $11,000,000. Telephones, electric lines, and short railways run to the surrounding mines. When the tourist is ready to continue his journey, he embarks on a well-appointed steamer at a busy wharf for a journey of 1,600 miles down the Yukon to St. Michael's, or to Nome on Bering Sea. The trip is described as an attractive one in summer. The river passes through extensive evergreen and poplar forests and vast tangles of luxuriant grasses. When the steamer swings up to the bank to transfer freight, the passengers go ashore and gather wild flowers, ferns, columbines, iris, yellow pond lilies, and lupines, or snatch a handful of the wild strawberries, raspberries, or huckleberries that grow in profusion. The Yukon is open about five months in the year, from May to October. At other times it is traversed by dog trains carrying only mails and articles of dire necessity. The mail carrier of Fort Yukon receives $2,000 a round trip for his dog train service. The sledge is drawn by a long string of half tamed dogs descended from the grey wolf of Alaska. London's *Call of the Wild* gives a vivid picture of this life.

Nome, on a fine harbor of Bering Sea, two hundred miles across a bay from the mouth of the Yukon, has a population of several thousand and is apparently a permanent commercial center. The description given above of Dawson may be repeated on a larger scale for Nome. Indications of wealth are evident in public buildings, schools, and houses, and well-kept lawns. A network of short railways connects the city with various gold mines. The plans of railway builders contemplate a line *via* Dawson to connect with the Skagway line and the railway system of northwestern Canada. Railway projectors, not mere dreamers, say that, some day, not so far distant, the Trans-Siberian railway of Russia will be extended to Bering Strait to meet an American line, and that, by means of a steam ferry or a tunnel, through trains may yet run from New York to Paris and Petrograd.

Climate. Like Siberia, of which it is an eastward continuation, Alaska contains both arctic and north temperate areas. The average temperature of the Arctic coast is below freezing. In the Yukon Valley a winter temperature of 50 degrees below zero may be expected for weeks at a time, and yet tracts farther south are said to have a more moderate winter, seldom ranging below zero. Statements as to the mildness of the climate of the Alaskan coast are difficult to believe, until it is remembered that a 2,000 mile arc from the tip of the Aleutian Isles around the North Pacific, by way of Sitka to the southeasterly termination at Dixon's Inlet, is in the latitude of the British Isles. Sitka is, in fact, on the parallel of Aberdeen, Copenhagen, and Moscow. An east and west line, drawn through the most northerly point of the arc mentioned, just misses the north end of Scotland, and passes through the southern tip of Norway, through the most fertile part of Sweden, and on by way of St. Petersburg. The

temperature is modified greatly by the Japan Current, corresponding in the Pacific, though in a feeble way, to the Gulf Stream in the Atlantic, with this difference, that the North Pacific is more effectually shielded from the chilling influences of Arctic currents whether of wind or of water. At Sitka the summers are always cool. The winter temperature seldom drops to zero. It is one of the rainiest places in the world, outside of the tropics.

AGRICULTURE. A number of the Aleutian Islands and certain districts of the interior are clothed in summer with luxuriant grasses. There are great possibilities of raising cattle. In some sections, particularly in a shorter valley south of the Yukon, these grasses cure on the stalk into excellent hay, on which cattle may feed all winter. The climate and shelter are such that cattle are able to care for themselves the year around. It is predicted freely that portions of Alaska will become known as famous grazing regions, equal to Texas and Montana. Mowing machines are already in use along the middle Yukon. Reindeer have been introduced into the north by the United States government. It is said that cereals may be raised in favored localities. Hardy vegetables of all sorts do well, and are beginning to be raised for local consumption. Apple trees still yield sour fruit in the old gardens of the Russian missions along the coast. Small fruits of all sorts, strawberries, currants, gooseberries, and old-fashioned flowers grow in profusion. Tourists speak of the pansies with rich colors.

MINERALS. The extent and value of the mineral deposits are not fully known and surveys continuing over several years will be necessary to ascertain these facts. Coal of excellent quality is mined in many localities. There is an abundance of low grade iron ore. Copper, lead and petroleum are present in large quantities.

Gold shipments to the United States in 1922 were valued at $6,881,020, while the total shipments for that year were valued at $6,986,769.

OTHER PRODUCTS. Alaska has long been noted for fine furs (Sea Seal). The fisheries are the most important industry. Herring and Cod are taken in large quantities and the salmon fisheries are the most extensive in the world, employing, in 1920, 24,423 men, and yielding over $10,000,000 of canned salmon yearly. The total value of the fisheries in 1920 was $41,492,124.

In January, 1914, Congress authorized the building of 1,000 miles of railroad in Alaska, and appropriated $35,000,000 for the purpose. This was one of the greatest engineering feats ever undertaken by the government, and it involved, before it was completed, the spending of a total sum of $56,000,000. The road was completed in 1922; and there are in Alaska, besides the government road, about 500 miles of privately owned railroad.

STATISTICS:

Population (1920)	54,899
Natives	27,883
Chief Towns:	
Juneau	3,058
Ketchikan	2,458
Anchorage	1,856
Sitka	1,175
Fairbanks	1,155
Nome	852
Members of Senate	8
Members of House of Representatives	16
Imports	$23,625,161
Exports	36,775,870
Reindeer	216,000
Seal in herds	552,718
Fox catch (1921)	1,621
Tin, tons	16
Platinum metals, ounces	1,477
Lead, tons	875
Copper, tons	35,000
Silver, value	$ 1,097,000
Coal, tons	61,111
Schools, Indian and white	132

Albania. The geographical district called Albania is composed of the Turkish provinces of Scutari and Janina, and parts of Monastir and Kossovo. It has an area of between 10,500 and 11,500 square miles and an estimated population of 1,400,000. The largest town is Scutari, with a population of 32,000; Durazzo, the provisional capital, has a population of 5,000.

The country is in every way primitive. There are few schools; banks or currency are unknown; great tracts of land are uncultivated, and such cultivation as is carried on is very crude. Albania possesses deposits of coal, copper, gold, lead and silver, but little mining is done. The prin-

cipal agricultural products are tobacco, olive oil and wool. The latter is woven into coarse, heavy cloth by the natives. Albania is for the most part rugged, wild and mountainous. There are no roads in the interior, and railroads are still unknown. Her seaports number five—San Giovanni de Medua, Durazzo, Valona, Porto Palermo and Santi Quaranta.

The Albanians are a quick-witted, original and aesthetic people, ruled by a strict code of honor and seeming to have no need of a universal system of justice. Almost two-thirds of these people are Moslems; of the remaining one-third, those in the north are Roman Catholics, and those in the south Greek Catholics.

But little is known of the early history of the Albanians. They were under Turkish rule from 1431 until 1912, with the exception of brief periods in the fifteenth and in the eighteenth centuries. The Albanian League, formed in 1880 with a view to gaining independence, was short lived. In 1912, however, Albanian independence was declared, and the London Ambassadorial Conference agreed to Albanian autonomy. That conference worked out approximate boundaries for the new country, and agreed that it should have a European ruler. Prince William of Wied was chosen, and arrived at Durazzo in March, 1914. But after the outbreak of the World War, Prince William left Albania and disorder followed. The Austrians overran the country in 1916. In 1917, Italy proclaimed Albania an independent country. There is now a Diet of 77 members; and at the head of the State is a Council of Regents, composed of a representative of each of the religious bodies of the country. Albania was admitted to the League of Nations in December, 1920.

Albany, the capital of the State of New York, and the county-seat of Albany County, is situated on the west bank of the Hudson River, and on the Boston & Albany (terminus), the New York Central & Hudson River, the West Shore, the Boston & Maine, the Delaware & Hudson railroads, and the Erie and Champlain Canals. It is 200 miles west of Boston, 145 miles north of New York City, and 297 miles east of Buffalo. The city has numerous street railways and interurban connections with neighboring cities.

Albany prides itself upon its facilities for education. It is possible for a child here to spend 17 years in study, including a four years' course at the State college, at a cost to the city of $1,258.79 and $1,000 to the state, a total gift of $2,258.79. There is also ample opportunity for parochial training. The public schools have special classes for defective children, and for vocational training—in a word, the schools of Albany are remarkable for their wide scope. At the State College one may graduate in pedagogy, law, medicine or pharmacy, nursing, library work, etc. The Albany Library School is the most important school for library training in the United States, and its graduates are eagerly sought in the large libraries of the country.

Some of the school buildings here are magnificent, as, for instance, the State Education Building, in architecture like a Greek temple, completed in 1913 at a cost of $5,500,000, and the new Albany High School, erected at a cost of $1,000,000.

There are many other fine structures in the city, among them the State Capitol, the City Hall, the Federal Building, the Albany Institute, and the State College for Teachers. Notable churches are All Saints' Cathedral, St. Peter's Episcopal Church, Cathedral of the Immaculate Conception, and the Temple Beth Emeth. There is an extensive boulevard system, a well planned park system, and the streets are well paved.

Albany's chief industries are car repairing, printing and publishing; foundries and machine shops; bakeries; the manufacture of shirts, collars and cuffs; men's clothing, tobacco, leather, brass, etc. According to the United States census for 1920 there were 382 industrial establishments, with a capital of $39,529,000, and products valued at $45,455,000. Population, 113,344.

Albany Congress, a conference called to meet in Albany in 1754. The first shot of the French and Indian War had been

fired near Great Meadows. The British authorities desired to unite the colonies in a policy of defense. Delegates were present from Maryland, Pennsylvania, New York, and the four New England colonies. After a treaty with the Iroquois had been completed, Benjamin Franklin, the possessor of the most constructive mind in the colonies, presented a plan for a colonial union. In some respects his proposal foreshadowed our present federal constitution. Provision was made for a grand council, composed of members sent by the respective colonies in proportion to population. This council was to have control of frontier settlements, Indian affairs, and taxes for common purposes. The delegates at Albany approved the idea and submitted the plan to the colonies and to the British Lords of Trade, but the notion was rejected all around. Franklin wrote: "Its fate was singular; the assemblies did not adopt it as they all thought there was too much prerogative in it, and in England it was judged to have too much of the democratic."

Franklin's "short hints" towards a scheme for uniting the northern colonies, are as follows:

A GOVERNOR-GENERAL.

To be appointed by the King.

To be a military man.

To have a salary from the crown.

To have a negation on all acts of the Grand Council, and carry into execution whatever is agreed on by him and that Council.

GRAND COUNCIL.

One member to be chosen by the Assembly of each of the smaller colonies, and two or more by each of the larger, in proportion to the sums they pay yearly into the general treasury.

Albany Regency. See VAN BUREN, MARTIN.

Albatross, ăl′bà-trŏs, an aquatic bird of the southern seas, allied to the petrel and the gull. There are several species. The wandering albatross, with a wing expanse of twelve feet, is the largest web-footed bird known. The hind toe is wanting. The foot is webbed to the very extremity. Occasionally, at least, this bird visits Tampa Bay, Florida. The albatross feeds on fish, but is far from nice in its choice of a meal. When food is plentiful, it gorges till it can hardly move. Any sea carrion, as the floating carcass of a whale, is acceptable. Flying fish are a favorite food. Except when rising from the water, the albatross floats so gracefully in the air that the motion of its wings is hardly perceptible. Its cry is said to be like that of a pelican, but it also brays like a donkey. Its flesh is not edible, although the eggs are eaten. The nest is formed by making a slight hollow in the sand not far from the sea. Only one egg, about four inches long, is laid. The albatross is a picturesque feature of the lonely Antarctic waters, where it follows the whaler's ship in hope of food. This trait is utilized by Coleridge in his *The Rime of the Ancient Mariner.* The black-footed albatross, a smaller bird, haunts the North Pacific. Flocks of fifteen or twenty follow the tourists' ship from San Francisco to the Aleutian Islands.

Albemarle Sound, a body of shallow water on the coast of North Carolina. It is separated from the Atlantic by sandbars, grown into low islands. The sound extends about sixty miles in an east and west direction. It is traversed by the thirty-sixth parallel of north latitude. The sound is not over eighteen feet deep, and does not afford draft for large ships. The discharge of numerous rivers, including the Chowan and the Roanoke, keeps the waters fresh. Tides and oceanic tempests are not felt within the shelter of the bars.

Albert I (1875—), the king of Belgium. He was born in Brussels, and was carefully educated. He devoted much time to the special study of economics and social science, and traveled extensively on the continent, in the Belgian Congo, and in the United States. In the latter country he made a study of railroads under the supervision of James J. Hill. He married Princess Elizabeth of Bavaria in 1900. King Albert is a second cousin of King George V of Great Britain and of Emperor William II of Germany. He is the son of Philip, Count of Flanders, the younger brother of King Leopold II. Leopold II, King Albert's predecessor, left no sons, and as his daughters were excluded from the throne by the Salic Law,

Albert succeeded to the throne on the death of King Leopold in 1909. When the Germans invaded Belgium in 1914, King Albert, despite the pleas of his loving subjects, placed himself at the head of his army. He suffered the dangers and hardships of active leadership uncomplainingly.

Albert is one of the most respected sovereigns in the world. Until the German invasion, his country was peaceful and prosperous, and yet he was constantly working for the improvement of his subjects, whom he loves. He is at once scholarly and active; he has striven for directness and honesty in his dealings with other European rulers; and in his private life has set a standard that anyone might well follow. It is because of his vigor and his unbounded concern for them that the Belgian people idolize their king.

Albert, Prince of Saxe-Coburg Gotha (1819-1861), married Queen Victoria and was called the Prince Consort. He was an enthusiastic supporter of science and art, giving both time and money in aid of learned associations. He died December 14, 1861. His name has been perpetuated generously. The Albert Embankment in the heart of London is an artificial stone wall along the Thames. It is three-fourths of a mile long, backed with earth, is sixty feet wide, and cost $5,000,000. The Albert Memorial at the south entrance of Kensington Gardens is a magnificent Gothic canopy on a spacious granite platform, ascended by steps on all four sides. Four marble groups at the four corners represent agriculture, commerce, manufacture, and engineering. In the center sits a colossal bronze-gilt figure of the Prince, wearing the robes of the Order of the Garter. The canopy bears in blue mosaic letters on a gold ground the inscription, "Queen Victoria and her People to the Memory of Albert, Prince Consort, as a tribute of their gratitude for a life devoted to the public good." Albert Hall, erected in London in 1871, is capable of seating 8,000 people. It contains one of the largest organs in existence. Lake Albert Nyanza, in Africa, was named for the Prince. See VICTORIA.

Alber'ta, a province of Canada. It lies between Saskatchewan and British Columbia. The province extends from the 49th to the 60th parallel of north latitude, and from the 110th to the 120th meridian.

The southern boundary and the northern boundary, followed eastward, pass near Paris and St. Petersburg respectively. Were it not that the southwestern corner is cut off by the Rocky Mountains, and thrown into British Columbia, the boundaries would be mathematical. Owing to the convergence of meridians, the width diminishes with regularity to the northward. The total area of land and water is 255,285 square miles, greater than that of North Dakota and Montana combined.

SURFACE. The southwest boundary line follows the main divide of the Rocky Mountains, thus giving the province that region of gorgeous scenic beauty, Rocky Mountain Park. This area, for which Banff is the gateway, has stupendous mountains, glaciers and icy streams, fish-laden lakes, hot springs, and other attractions. The greater part of the province, however, is a vast rolling prairie. The province is drained chiefly by the headwaters of the Mackenzie and the Saskatchewan rivers. The area tributary to Hudson Bay is less than that within the basin of the Mackenzie. The valley of the Milk River is tributary to the Missouri. The western side of the district is mountainous, containing, however, many valleys which broaden out into a prairie region in the east. The foothills, lakes, and streams are well wooded. The prairies are covered with wild flowers and characteristic grasses.

CLIMATE. The climate of southern Alberta is modified by the Chinook winds. It is moderate in comparison with the more central parts of the Great Plain. Besides the direct influence of the strong Chinook in the south the climate of the whole province is considerably moderated by the influence of the warm westerlies from the coast. This makes possible the settlement of the country northward as may be seen by the growth of towns and cities.

Precipitation is not heavy over the province. The annual precipitation in no place goes much above twenty inches and is considerably below this in the southern part of the province. The snow does not lie throughout the winter in southern Alberta but it does in the middle and north. While the precipitation is not heavy, about sixty per cent of the moisture falls in May, June and early July, and the growth is very rapid. The autumn season is dry and threshing is done outside.

The climate on the whole is attractive. The winters are relieved by moderate changes and the summers are cool at night. The air is a quickly evaporating air; its clearness and the great proportion of sunny weather are conducive to the enjoyment of outdoor life both in work and play; the days in summer are long. There is in midsummer a daily darkness of only five hours (10 P. M. till 3 A. M.), thus giving a prolonged day for growing. The great amount of dry, clear weather has led the settlers to adopt the term "Sunny Alberta."

Soil. Expressed in acres the total area of Alberta is 158,878,660. Of this 1,510,400 is the area covered by lakes and rivers leaving 157,368,260 acres of land. The mountains, foothills and waste land, some of which is subject to reclamation, reduce the immediately arable land to 81,300,000 acres, or about one-half of the total area. It is readily seen that Alberta is an agricultural province. It is especially famous for its production of wheat.

The soil of the province is excellent. It varies between a finely pulverized, quick, friable brown loam in the south to darker loams and black lands in the centre and north. The subsoil is generally clay. In the south there is considerable open prairie. With progress north scrub increases and bluffs of poplar and willow alternate with open stretches. On the open prairie the farms are large and a good deal of the work on the land is done by steam and gasoline power. Tractors are used for breaking the scrub area of other parts, with incredible speed.

Live Stock. The central and northern parts of the province are devoted to mixed farming with special undertakings in pure-bred stock raising and in special dairying. The annual output of dairy products is now about $40,000,000, of which dairy butter comprises about twenty per cent. Most of the creameries are co-operatively owned, and Edmonton claims the largest creamery in the Dominion. The following figures are accurate yearly averages for the numbers of live stock: Milch cows, 400,000; other cattle, 1,500,900; horses, 1,000,000; sheep, 400,000; swine, 600,000.

Minerals. It has been estimated that Alberta has 75 per cent of the coal wealth of Canada, and 14 per cent of the coal reserves of the world. The yearly output is now about 12,000,000 tons of bituminous, 3,000,000 tons of lignite, and 100,000 tons of anthracite, most of the last from one mine. The known areas of coal lands are roughly 30,000 square miles, with a total deposit of 1,000 billion tons. At the present rate of production it would take 70,000 years to exhaust the supply. Natural

Irrigation. Southern Alberta was a ranch country up to 1900. Then both irrigation and dry farm settlers began to come into the open prairie, and the growing of alfalfa, roots and grain became rather general. The yields of grain are sometimes enormous. Alberta is believed to hold the world's record for the production of wheat—over fifty-four bushels per acre on one thousand acres—and yields on smaller areas have gone beyond seventy bushels an acre. A ten-year average, however, is nearer twenty-five bushels an acre, the limiting factor, especially in southern Alberta, being an occasional dry year. The irrigated areas produce heavy crops.

Manufactures. Manufacturing has just begun in the province. Flour, oatmeal, cement and linseed oil mills, pork and beef packing houses, factories with outputs of products in clay, brass and iron, glass and wood, have been established, and are being rapidly increased.

History. Alberta was originally part of Prince Rupert's Land, the domain of the Hudson's Bay Company. The earliest traders reached it by dog train and canoes, but later the Red River cart, the steam-

boat, and prairie schooner carried in the baggage and families of hundreds of settlers. The arrival of the Canadian Pacific Railway in 1883 was followed by an educational campaign which inspired a tremendous flood of immigration from Great Britain, United States and Eastern Canada. The population increased from 73,000 in 1901 to 185,000 in 1906; 374,655 in 1911; and 581,995 in 1921. Calgary, Edmonton (the capital), Lethbridge and Medicine Hat are the chief cities in order of size.

The name Alberta was given to a part of the Northwest Territories in 1882, in honor of the visit of the Princess Louise Alberta, daughter of Queen Victoria and wife of the Marquis of Lorne, then governor general of the Dominion. The province, with its present boundaries, was created by act of the Dominion Parliament in 1905. Like the other provinces, it is duly represented in Parliament, and its provincial affairs are managed by a lieutenant governor, appointed by the governor general of the dominion. The provincial assembly has fifty-six members.

The first premier, Alexander C. Rutherford, held office from September, 1905, to 1910, when he was followed by Arthur L. Sifton, formerly chief justice of the province. During these first two ministries the chief problems concerned the construction of railways and the amount of aid to be given private enterprise by the province. In 1913 and 1914 occurred the great oil boom in the Calgary district, and in 1915 the people voted in favor of prohibition. Since 1916 women have had the same political rights as men.

Education. At the head of the public school system stands the University of Alberta, established in 1908. Affiliated with it are a number of denominational schools. The province is divided into over 3,000 school districts, each of which elects its local board, which functions under the general direction of the provincial department of education. There are some forty schools in Alberta with grades numbered from 1 to 12; the first eight grades are the primary school and the other four are the high school, and a regular examination must be passed to gain entrance to the higher grades. There has been a marked tendency to supplement the usual curriculum by vocational or technical study, especially in agriculture.

The University of Alberta, situated at Edmonton, Alta., is administered by a board of governors, whose functions are those of business management. A senate is entrusted with the supervision of the educational work. At the beginning of the University, instruction was provided only in the arts and sciences. A law faculty was added in 1912, and faculties of applied science and of medicine in 1913, and one of agriculture in 1915. Recently faculties of pharmacy, household economics, commerce and theology have been added, developing the institution into a University of broad scope. The University was organized in 1907, and in the year 1921-22 had a registration of 1,285 students.

Statistics. These are the latest available:

Population	581,995
Calgary	65,305
Edmonton	58,821
Lethbridge	11,097
Medicine Hat	9,634
Members of Canadian Senate	6
Members in House of Commons	12
Representatives in Provincial Assembly	56
Grain crops (latest available five-year averages):	
Wheat, bushels	35,000,000
Oats, bushels	72,000,000
Barley, bushels	8,600,000
Potatoes, bushels	8,000,000
Hay, tons	250,000
Dairy products	$40,000,000
Timber lands, acres	5,400,000
Forest reserves and parks, acres	4,357,000
Mineral production	$20,000,000
Railway mileage	5,000
Children in public schools	152,000
Students in University	1,285

Albert Nyanza, nī-ăn′za, one of the great lakes of Central Africa. It lies in the great rift between Uganda and the Congo State. Its surface is 2,720 feet above the level of the sea. The lake discharges its waters northward through the White Nile. It is ninety-seven miles in length, and is about one-fourth as wide. It is about one-fifteenth as large as the Victoria Nyanza. The shores are picturesque, mountains and cliffs rising from

1,500 to 7,000 feet above the surface of the lake. Nyanza is a Bantu word meaning great water. The lake was first visited by Sir Samuel Baker in 1864. It was named for Albert, consort of Queen Victoria. See NYANZA; UGANDA.

Albert Edward Nyanza, a lake in Central Africa, which covers an area of 820 square miles, on the boundary between Belgian Congo and Uganda. Henry M. Stanley discovered it in 1876 and gave it the name of Albert Edward after the then Prince of Wales, later King Edward VII. A part of the Semliki River empties into Albert Edward Nyanza, through a valley in the Ruwenzori Mountains, which were explored by the Duke of Abruzzi in 1906. The region is remarkable for the number of lakes which have been formed in extinct craters and also for the numerous geysers. Fish is abundant, and crocodiles, hippopotami and other animals are found in the vicinity of this lake, especially in the swampy regions. The meaning of the name Nyanza is great water, and is frequently applied in Africa.

Albertus Magnus (1193-1280). This German philosopher and Dominican friar stands out conspicuously during a time not noted for its many men of learning. He was the chief expounder of the ideas of Aristotle in his time, as well as a prolific writer on scientific subjects. He has been styled "Doctor Universalis," and because of his wide chemical knowledge was accused of practicing the black art. The myth of his transforming a wintry scene on the occasion of a banquet to the king, into one of balmy summer beauty, may be explained by the fact that Albertus had a greenhouse. The last decade of his life was devoted mainly to the consideration of religious questions. There is considerable doubt as to the authorship of some of the works commonly reputed to be his.

Albigenses, ăl-bĭ-jĕn′sēz, a religious sect of the twelfth and thirteenth centuries. They opposed the teachings of the Church of Rome. Their principal center was Toulouse, in the south of France. Like all heretical sects they were considered seditious. An armed crusade against them was ordered by Pope Innocent III. Political hatred and desire for plunder on the part of the nobles of northern France, were cloaked in the guise of religious zeal. "Slay all, God will know his own," was the war cry. They were suppressed by battle, conversion, inquisition, torture, and massacre. Forty thousand innocent and, in a way, inoffensive people, many of them Catholics, were killed in cold blood in a single campaign. The destruction of the sect does not appear to be other than one of those great catastrophes that happen without need and without any counterbalancing advantage to the world.

The Albigenses were the most formidable of several heretical sects produced in the twelfth century by a general social and religious discontent. All these movements seem to have drawn strength chiefly from popular feeling against the wealth and corruption of the higher clergy; and most of them quickly subsided when the church roused and reformed itself. But the Albigenses rejected important doctrines of the church, and soon came to rebel against its government. They had their home in Languedoc, or southeastern France, and in that region the dislike for the clergy became so intense that the old byword, "I had rather be a Jew," was exchanged for "I had rather be a priest." Popes and church councils made various ineffectual attempts to reclaim the heretics, and finally Innocent III proclaimed a holy war against them as "more wicked than Saracens." For a hundred years, popes had been preaching a war of the cross against the Mohammedans in Palestine: now a crusade was preached against a sect of Christian heretics. Raymond, the mighty Count of Toulouse, tried to protect his subjects; but the feudal nobles of northern France rallied to the Pope's call. Besides the religious motive, these lords hated the rising democracy of southern city-France, and hungered for its rich plunder. A twenty-years' struggle, marked by ferocious massacres, exterminated the heretics and the rising prosperity of Languedoc.—West, *Modern History.*

Albinos, ăl-bī′nōs, persons or animals whose skin and hair are lacking in coloring matter. The hair of an albino is much whiter than so-called light or flaxen hair. Differences in complexion, at least differences in hue, are due to the different colors of a pigment which nature stores between the transparent cuticle and the true skin. Albinos lack this coloring pigment. In other respects they are like other people. Albinos are found among all races. A negro albino is, of course, more noticeable, as a colorless, white haired ne-

gro must be. Owing to this want of pigment the blood vessels of an albino's eye are visible all the time, and give it a fiery, bloodshot appearance. An albino is sensitive to strong light, but can see better at night than other people. Lack of coloring matter, or albinism, has been observed in domestic animals and in birds. Dogs, cats, horses, sheep, hares, rabbits, rats, and mice afford examples of albinos. The famous white elephants of Siam are albinos. The white zebu of India, the sacred bull led in religious festivals, is simply an albino. An albino trout is one of the curiosities of the fish kingdom.

Albumins, ăl-bū′mĭns, a class of nitrogenous substances occurring naturally in animals and plants. The white of an egg is a nearly pure, concentrated solution of albumin (egg-albumin) in water. Albumins constitute an important ingredient of the blood of animals, and also of milk. Wheat, oats, rye, and nearly all vegetables yield some albumin. In many vegetables the albumin is lost when the material is soaked in cold water for some length of time. Animal and vegetable albumins do not differ much from one another in composition, and are composed of carbon, oxygen, nitrogen, hydrogen, and sulphur. Albumins are soluble in water and coagulated by heat. When added to certain liquors, they have the property of combining with some of the suspended solid matters and carrying them to the bottom. On account of this property, white of an egg is used frequently to clear coffee.

Blood albumin was at one time extensively used in sugar refineries to clear sugar. In cases of poisoning, especially from corrosive sublimate, the white of an egg is sometimes a successful remedy, since in coagulating it combines with the poisonous substance and serves to prevent its action on the stomach. Albumins constitute an important ingredient in animal and human food. An animal can exist for a considerable time without fats and carbohydrates, but its death is assured by the withdrawal of albumins from its nourishment. Commercial albumin is obtained chiefly from two sources, eggs and the serum of blood. In the arts it is used to size paper or give it a lustrous coating, and to secure fast colors in connection with dyeing and printing. It is also used in photography and pharmacy, and in the manufacture of confectionery. Slaked lime forms with albumin solution a useful cement.

The term "albumen," was originally a name applied by scientists to the white of an egg. It is derived from a Latin word *albus,* signifying white. In botany the word has been extended to apply to that portion of a seed technically known as the endosperm, although the seed may or may not be rich in albumins. Seed albumen is best illustrated in the hemispherical halves of beans, peas, coffee, and peanuts—the nourishment stored up in the seed. It also constitutes the floury part in corn, wheat, and like grains, the oily part in poppy seeds, and the fleshy part in the cocoanut.

Albuquerque, ăl-bo͝o-kûr′kā, the metropolis of New Mexico, the county-seat of Bernalillo County, situated on the Rio Grande River about sixty miles southwest of Santa Fe. Old Albuquerque was founded by the Spaniards in 1706 and named in honor of the viceroy of New Mexico. The new part of the town, Albuquerque proper, may be said to date from 1880. The Atchison, Topeka & Santa Fe and the Atlantic & Pacific railroads pass through the city, which is 4,850 feet above sea level, in a region rich in gold, silver, iron, and coal. The industries include railroad and machine shops, a mammoth lumber mill, brick, lumber, sash, doors, boxes, and extensive trade in wool and hides. The University of New Mexico, unique in that the buildings are in the Pueblo style of architecture, is situated here, also a government school for Indians and several academies. The city is noted for its equable climate and almost perpetual sunshine, making it a popular health resort, particularly for pulmonary complaints. Four large sanitariums are located here. Albuquerque has grown rapidly. In 1900 its population was 6,238, while by the census of 1920 it is 15,157. See NEW MEXICO.

Alcestis, ăl-sĕs′tĭs, in Greek legend, the wife of Admetus, king of Thessaly.

Admetus was mortally ill, but, at the request of Apollo, the Fates agreed to spare his life if some one would die in his stead. Admetus was overjoyed, as he had many friends. He found none willing to die, however, until Alcestis offered to make the sacrifice. She was at the point of death, when her life was saved by the intervention of Hercules. Alcestis furnishes the subject and title for one of the plays of Euripides, a melodrama, rather than a tragedy. Browning gives the full story of this play in *Balaustion's Adventure,* where he speaks of it as

That strangest, saddest, sweetest song of his,
Alcestis.

Other quotations are:

What kind of creature should the woman prove
That has surpassed Alcestis?

When King Admetus went his rounds, poor soul,
A-begging somebody to be so brave
As die for one afraid to die himself—
Thou, friend? Thou, love? Father or mother, then!
None of you? What, Alcestis must Death catch?
O best of wives, one woman in the world!

See EURIPIDES.

Alchemy, in the history of science, a term applied to medieval chemistry. Quoting from the *Century Dictionary,* "The doctrines and processes of the early and medieval chemists; in particular, the supposed process, or the search for the process, by which it was hoped to transmute the baser metals into gold." From *Encyclopedia Britannica,* we add, "Alchemy was, we may say, the sickly but imaginative infancy through which modern chemistry had to pass before it attained its majority, or, in other words, became a positive science." The derivation of the word indicates that alchemy was originally the art of extracting juices from plants for medicinal purposes. In the dawn of science there was little distinction between the different branches now recognized; but alchemy may be said to bear the relation to modern chemistry that astrology sustains to astronomy, and magic to medicine. The medieval students of alchemy are not to be regarded with scorn. They were working in the dark. Without them modern science would have been impossible. This view is maintained ably by Hoefer in his *History of Chemistry:*

Let us forget for an instant the advances which this science has made since the 5th century. Let us fancy ourselves for a moment transported to the laboratory of one of the great masters of the sacred art, and watch as neophytes some of his operations.

First Experiment.—Some common water is heated in an open vessel. The water boils and changes to an aëriform body (steam), leaving at the bottom of the vessel a white earth in the form of powder. Conclusion—water changes into air and earth. What objection could we make to this inference, if we were wholly ignorant of the substances which the water holds in solution and which are, after evaporation, deposited at the bottom of the vessel?

Second Experiment.—A piece of red-hot iron is put under a bell which rests in a basin full of water. The water diminishes in volume, and a candle being introduced into the bell sets fire at once to the gas inside. Conclusion—water changes into fire. Is not this the natural conclusion which would present itself to any one who was ignorant that water is a composite body, consisting of two gases, one of which, oxygen, is absorbed by the iron, while the other, hydrogen, is ignited by contact with the flame?

Third Experiment.—A piece of lead, or any other metal except gold or silver, is burned (calcined) in contact with the air. It immediately loses its primitive properties, and is transformed into a powder or species of ashes or lime. The ashes, which are the product of the death of the metal, are again taken and heated in a crucible together with some grains of wheat, and the metal is seen rising from its ashes and reassuming its original form and properties. Conclusion—metals are destroyed by fire and revivified by wheat and heat. No objection could be raised against this inference, for the reduction of oxides by means of carbon, such as wheat, was as little known as the phenomenon of the oxidation of metals. It was from this power of resuscitating and reviving dead, *i.e.,* calcined metals, that grains of wheat were made the symbol of the resurrection and life eternal.

Fourth Experiment.—Argentiferous lead is burned in cupels composed of ashes or pulverized bones, the lead disappears, and at the end of the operation there remains in the cupel a nugget of pure silver. Nothing was more natural than to conclude that the lead was transformed into silver; and to build on this and analogous facts, the theory of the transmutation of metals, a theory which, later on, led to the search for the philosopher's stone.

Fifth Experiment.—A strong acid is poured on copper, the metal is acted upon, and in process of time disappears, or rather is transformed into a green transparent liquid. Then a thin plate of iron is plunged into this liquid, and the copper is seen to reappear in its ordinary aspect, while the iron in its turn is dissolved. What more natural than to conclude that iron is transformed

into copper? If instead of the solution of copper, a solution of lead, silver, or gold had been employed they would have held that iron was transformed into lead, silver, or gold.

Sixth Experiment.—Mercury is poured in a gentle shower on melted sulphur, and a substance is produced as black as a raven's wing. This substance, when warmed in a closed vessel, is volatilized without changing, and assumes a brilliant red color. Must not this curious phenomenon, which even science in the present day is unable to explain, have struck with amazement the worshippers of the sacred art, the more as in their eyes black and red were nothing less than the symbols of light and darkness, the good and evil principles, and that the union of these two principles represented in the moral order of things their God-universe?

Seventh and last Experiment.—Organic substances are heated in a still, and from the liquids which are removed by distillation and the essences which escape, there remains a solid residuum. Was it not likely that results such as these would go far to establish the theory which made earth, air, fire, and water the four elements of the world?

See CHEMISTRY; ELIXIR; PHILOSOPHER'S STONE.

Alcibiades, ăl-sĭ-bī′a-dēz (450-404 B. C.), a brilliant but unprincipled Athenian. He was a nephew of Pericles and a pupil of Socrates. Socrates saved his life in battle. A few years later Alcibiades rendered the philosopher a similar service, thus cementing a friendship, which, however, appears to have had little influence on the character of the younger man. Alcibiades was wealthy and profligate, but he was popular. He posed as a radical. He is charged with inciting strife between the Greek cities. For personal ends he stirred up his native city against Sparta, and tried to renew the Peloponnesian War. He persuaded the Athenians to fit out an armament, partly under his command, for the capture of Sicily. On the night before his departure the statues of the god Hermes were thrown down throughout the city, it is believed by Alcibiades and a lot of his riotous companions by way of a parting lark. He was recalled on the charge of impiety to plead for his life, but fled instead to Sparta, where he adopted a plain mode of living, and ingratiated himself, as he had done at Athens, by pretending to be what he was not. From Sparta Alcibiades fled to Persia. From Persia he was recalled to Athens and restored to favor. Again he fled to Asia with his wealth, and finally was assassinated by a flight of arrows as he attempted to escape from his burning home. There is little in the life of Alcibiades worthy of study, except as it illustrates the factional spirit in Greece, and the facility with which an unprincipled man effects a change of base. His career was one of intrigue and wasted opportunity. A glimpse of his character may be gleaned from an incident related by Plutarch. Alcibiades paid 7,000 drachmas, the value of 100 oxen, for a very handsome dog, and then cut off his tail in order that the Athenians might have something fresh to talk about and stop gossiping about his other misdeeds.

Alcmaeon, alk-mē′on, in Grecian legend, the son of Amphiaraus and Eriphyle. Eriphyle urged Amphiaraus to undertake the expedition of the seven against Thebes. Amphiaraus took offense and commanded his son Alcmaeon to slay the mother. As an oracle, whom the son Alcmaeon consulted, also advised Eriphyle's death, Alcmaeon slew her. As a punishment he was driven mad by the Furies, and wandered away from Argos seeking purification from his crime. In Arcadia Phegeus, the king of Psophis, relieved him from the Furies and gave him his daughter in marriage. To her Alcmaeon gave the necklace and peplus of Harmonia, which his mother Eriphyle had received from Polynices. In consequence of his presence the land of Psophis became barren. Alcmaeon fled to the mouth of the river Achelous for further purification. Here he married Callirrhoe, daughter of the river god. To gratify her vanity, although against his better judgment, he returned to Arcadia to procure for her the fatal necklace and robe of Harmonia. He told Phegeus he wished to dedicate them on the altar of the oracle at Delphi. Phegeus gave Alcmaeon the ornaments, but learning for whom they were really intended, he sent his sons to waylay and kill Alcmaeon while returning to his wife. Alcmaeon was a favorite subject of Greek

tragedies, but none are now extant. See HARMONIA; SEVEN AGAINST THEBES; CALLIRRHOE.

Alcohol, a term popularly applied to the substance which imparts to fermented and distilled liquors an intoxicating property. In modern chemistry the word has a much wider meaning, being applied to a very numerous class of substances, in many members of which the properties characteristic of ordinary alcohol are conspicuous by their absence. Chemically, an alcohol may be defined as a neutral compound composed of the three elements, carbon, hydrogen, and oxygen.

Alcohols are found as natural constituents of many vegetable and animal products, such as certain oils, fats, and waxes. Some alcohols are liquids, while others are solids. So-called ethyl alcohol, or "spirit of wine," is formed in the fermentation of solutions of sugar. When yeast is added to a solution containing grape sugar or glucose, the liquid soon has the appearance of boiling. A fundamental change takes place in the sugar whereby it is broken up into alcohol and carbon dioxide. The process is called fermentation. Yeast alone cannot ferment cane-sugar. The cane-sugar must be first decomposed into fermentable sugar, as grape sugar or fruit sugar; and this decomposition is effected by a substance known as invertase, which invariably accompanies yeast. The ordinary method of obtaining alcohol is to form a thin paste of crushed potatoes, finely ground grain, or of any vegetable material containing starch. The starch is first changed into sugar by the action of malt, then fermentation is produced by the addition of yeast.

Commercial alcohol is never pure, but usually contains from five to ten per cent of water. By careful redistillation the amount of water may be reduced to about two per cent, and this can be removed by adding quicklime, which unites with the water. The liquid which is poured off is distilled again, thus forming approximately pure or absolute alcohol.

Pure alcohol is a mobile, colorless liquid with an agreeable ethereal odor. It has a strong affinity for water, which it readily absorbs from the atmosphere. It mixes with water in all proportions with marked contraction and rise in temperature. The maximum contraction is obtained by mixing 52 volumes of alcohol with 48 volumes of water, the volume of the mixture being 96.3 instead of 100. Pure alcohol boils at 173 degrees Fahrenheit under one atmosphere pressure, and freezes at 202 degrees below zero. It burns with an intensely hot, pale-blue, non-luminous flame. It has a specific gravity of 0.7938 at 60 degrees temperature; in other words, its weight is about eight-tenths as much as water. The amount of alcohol in a mixture of alcohol and water is determined by means of a special form of hydrometer, called an "alcholometer," the scale of which gives directly the per cent by weight or volume for a given temperature, usually 60 degrees Fahrenheit. The point at which the instrument sinks in pure alcohol is marked 100; a similar point for pure water is marked 0. When placed in a mixture, the instrument sinks to a point intermediate between these marks according to the relative proportions of water and alcohol.

Investigations have shown that 100 pounds of the following products of the farm will produce industrial alcohol in the following quantities: Rice, 6 gallons; rye, barley, spelt, corn, and sorghum seed, 5 gallons; Irish potatoes, 1½ gallons; cassava, 2½ gallons; turnips, 4 to 5 gallons; artichokes, 1¼ gallons; sugar beets, 2 gallons; sorghum or sugar cane, 1 gallon; waste molasses, 6 gallons; grapes, 2⅙ gallons; bananas, 1⅗ gallons; and other fruits from 1 to 1½ gallons. The average range of the alconol content in various fermented and distilled liquors may be stated as follows: Beers, ale, and porter contain from 2 to 6 per cent of alcohol; wines from 8 to 20 per cent; brandy, whisky, and rum from 45 to 55 per cent.

Alcohol is extensively used in the preparation of lacquers, varnishes, dyes, flavoring extracts, and pharmaceutical preparations. It hardens animal tissues and is destructive of most forms of bacteria. These facts make it a valuable preserva-

tive for specimens of natural history. It is occasionally of great value in medicine, and in certain emergencies, where prompt stimulating action is demanded, it is indispensable. On account of its low freezing point, it is used instead of mercury in thermometers intended for measuring low temperatures.

Wood alcohol is obtained by the careful heating, or so-called "dry distillation," of hardwood—beech, maple, or birch—in iron retorts. The aqueous distillate contains the wood alcohol mixed with acetic acid and some minor ingredients, and is known as pyroligneous acid. Tarry matter and other substances separate out on standing and are then removed. The acetic acid is combined with lime and the wood alcohol purified by fractional distillation and other methods. Wood alcohol boils at 150.8 degrees and burns with a blue flame. It can be used for many of the purposes for which the common ethyl alcohol is used, but on account of its poisonous properties it cannot be used in foods and beverages.

Denatured alcohol is ethyl alcohol rendered unfit for drinking by the addition of a substance having a disagreeable taste or odor. Methyl alcohol and benzine are the denaturing agents authorized by the United States commissioner of internal revenue. Ten parts of wood alcohol and one-half part of benzine are added to 100 parts by volume of ethyl alcohol of not less than 90 per cent strength. In Germany, in addition to wood alcohol, a certain amount of pyridine (bone oil) must be added. This gives a denatured alcohol of a very offensive odor, but does not render it unfit for many commercial uses. Other substances have been proposed for denaturing, some of which are the following: gum shellac, camphor, turpentine, acetic acid, aniline blue, castor oil, carbolic acid, caustic soda, and musk.

Alcohol as Fuel. The possibilities of alcohol as a fuel for internal-combustion engines have been widely discussed in recent years. The matter is important to both the automobile and the agricultural interests of the United States and Canada, because alcohol is manufactured from various products of the soil and the use of small stationary or portable liquid-fuel engines, as well as automobiles, is very common among agriculturists.

The supply of crude oil to be obtained in the United States must ultimately diminish, and the history of the past indicates that a constant increase in the price of kerosene and gasoline may reasonably be expected. On the other hand, it is not unreasonable to expect that, with improvements in agriculture and in processes of manufacture, the cost of alcohol may fall.

An official investigation of the merits of alcohol for fuel use in New York City, in the mechanical engineering laboratories of Columbia University, had two main objects in view: First, to determine whether the gasoline and kerosene engines on the American market can run on alcohol as fuel, and the relative consumptions of different fuels; second, to determine the improvements which might be desirable in the design of engines manufactured especially for alcohol. The tests were made with farm engines of the four-cycle gasoline type and the two-cycle kerosene type; four-cylinder gasoline automobile engines, and a small gasoline marine engine of the verticle two-cycle type. The following general conclusions were reached as a result of the tests:

(1) Any gasoline engine of the ordinary types can be run on alcohol fuel without any material change in the construction of the engine. The only difficulties likely to be encountered are in starting and in supplying a sufficient quantity of fuel, a quantity which must be considerably greater than the quantity of gasoline required.

(2) When an engine is run on alcohol, its operation is more quiet than when run on gasoline, its maximum power is usually materially higher than it is on gasoline, and there is no danger of any injurious hammering with alcohol such as there is with gasoline.

(3) For automobile air-cooled engines, alcohol seems to be especially adapted as a fuel, since the temperature of the engine cylinder may rise much higher before

auto-ignition takes place than is possible with gasoline fuel; and if auto-ignition of the alcohol fuel does occur, no injurious hammering can result.

(4) The consumption of fuel in pounds per brake horse-power, whether the fuel is gasoline or alcohol, depends chiefly upon the horse-power at which the engine is being run and upon the setting of the fuel supply valve.

(5) The investigations also showed that the fuel consumption was affected by the time of ignition, by the speed, and by the initial compression of the fuel charge. No tests were made to determine the maximum possible change in fuel consumption that could be produced by changing the time of ignition, but when near the best fuel consumption it was shown to be important to have an early ignition. So far as tested, the alcohol fuel consumption was better at low than at high speeds. So far as investigated, increasing the initial compression from 70 to 125 pounds produced only a very slight improvement in the consumption of alcohol.

(6) It is probable that for any given engine the fuel consumption is also affected by the quantity and temperature of cooling water used and the nature of the cooling system, by the type of ignition apparatus, by the quantity and quality of lubricating oil, by the temperature and humidity of the atmosphere, and by the initial temperature of the fuel.

(7) With any good small stationary gasoline engine as small a fuel consumption as 0.70 pound of gasoline or 1.16 pounds of alcohol per brake horse-power hour may reasonably be expected under favorable conditions. These values correspond to 0.118 and 0.170 gallon respectively, or 0.95 pint of gasoline and 1.36 pints of alcohol.

In the automobile engines tested with alcohol fuel, but a small proportion of the liquid was vaporized in the carburetor.

Alcott, Amos Bronson (1799-1888), an American philosophical writer and educator. The son of a farmer, he worked, as a boy, for a country storekeeper; made an unsuccessful attempt to peddle merchandise, and in 1823 opened an infant school. Acquiring some local fame by his methods of teaching, he removed to Boston and for some years conducted there a school of the same sort. His method was that of teaching by conversation, his theory being that the child's mind should be developed independently according to individual faculties, not molded by imposing upon it knowledge from the outside. His system met with disfavor and he retired to Concord. From this time Alcott devoted himself to expounding reform views on a great variety of subjects. He was associated intimately with Emerson, Hawthorne, Thoreau, and Channing, became dean of the Concord School of Philosophy, and was a leader among the Transcendentalists. Emerson and other eminent thinkers have acknowledged an obligation to Alcott. He may be compared with Coleridge, as one who, while his own work was fragmentary, became a powerful agency in changing and directing the current of philosophic thought.

Alcott, Louisa May (1832-1888), an American story writer. She was the daughter of Amos Bronson Alcott, an educator and lecturer of some note, an intimate friend of Emerson. She was born at Germantown, Pennsylvania. When she was two years old, her parents moved to Boston, and six years later they settled at Concord. Here this gifted woman spent the greater part of her life, doing housework, waiting on her father, composing magazine articles, and writing stories for children. In 1862 she went to Washington as a war hospital nurse. On her return she published *Hospital Sketches,* which proved that her real talent lay in telling simple, wholesome stories of commonplace people. Up to this time she had written only "pot boilers," most of them of a sensational character, having no permanent value. In 1868 *Little Women* was published. Upon this story Miss Alcott's real reputation rests. It is the most popular juvenile book ever produced in America. Sixty thousand copies were sold the first year. *Little Men,* written in the same vein, is also a favorite. Other popular stories are *Eight Cousins, Rose in Bloom, Old Fashioned Girl, Un-*

der the Lilacs, Jack and Jill, Jo's Boys. Miss Alcott published also several volumes of short stories. *Aunt Jo's Scrap Bag, Silver Pitchers, Proverb Stories, Spinning Wheel Stories,* and *Lulu's Library* are among them.

Little Women is the story of the lives of Miss Alcott and her three sisters. Some one has said of it that it seems to be an addition to one's actual experiences, rather than to one's memories of fiction. This gives the keynote to the popularity of Miss Alcott's stories. They are faulty from a literary point of view. They have little plot or artistic qualities of any sort. They are simply wholesome, happy, breezy stories of boys and girls who are very natural, very faulty, but who are growing continually toward their ideals.

"*Little Women* is the world-photograph of the New England home and the American girl." Miss Alcott's books still sell at the rate of 100,000 a year, and of *Little Women,* alone, written over forty years ago, 20,000 copies were sold in 1908. The famous quartette of girls are all dead now, but the originals of the Demi and Daisy of the book, and a daughter of Amy still live and divide the royalties accruing from their aunt's labor.

It was Miss Alcott's custom, when she had some important piece of writing on hand, to go into Boston. There, in a little garret room surrounded by her books and papers, she would put her whole heart and mind to the work till it was finished. She died in Concord two days after the death of her father. The old Alcott home and the Alcott lot in the burying ground, near the graves of Hawthorne, Thoreau, and Emerson, are seen by many visitors. *Louisa May Alcott, Her Life, Letters and Journals,* by Ednah D. Cheney, is almost as entertaining a story as any written by Miss Alcott herself.

Alcuin, al'kwin (735-804), an English prelate and scholar. He was born at York, England, and died at Tours, France. Alcuin wrote treatises on grammar, rhetoric, history, spelling, argumentation, theology, and other subjects. Charlemagne invited him to settle on the continent and to become the master of the "School of the Palace." During his lifetime Alcuin was the confidante and adviser of Charlemagne in education and in church affairs. The following extract is taken from a letter written (in Latin, of course,) by Alcuin to Charlemagne. The monastery of St. Martin was at Tours:

"In obedience to your exhortation and wise desire, I apply myself in serving out to some of my pupils in this house of Saint Martin the honey of the holy writings; I essay to intoxicate others with the old wine of antique studies; one class I nourish with the fruits of grammatical science; in the eyes of another, I display the order of the stars." . . .

"I have schools of singers, many of whom are already sufficiently instructed to be able to teach others. . . . I have also done in this church what lay in my power, as to copying books. . . . I have roofed the great church of this town, . . . and have reconstructed a portion of the walls; . . . for the priests, I have constructed a cloister."

See CHARLEMAGNE.

Alden, Isabella McDonald (1841-), an American author, who wrote under the pen name of "Pansy." She was born at Rochester, New York. Mrs. Alden wrote a series of about 75 books for juveniles, which were called the *Pansy Books.* She also wrote for more mature readers a life of Christ, under the title *The Prince of Peace, Unto the End, Her Own Way,* and *A King's Daughter.* She was at various times connected with newspapers.

Alden, al'den, **John** (1599-1687), one of the Pilgrim fathers. In England he was a cooper and resided at Southampton. He came to Plymouth in the Mayflower in 1620, and was a man of importance in Plymouth colony for fifty years. He is the suitor of "Priscilla" in Longfellow's *The Courtship of Miles Standish.* As a matter of history, John Alden was the confidential assistant of Captain Standish and lived in his family. His marriage with Priscilla was the third wedding in the colony.

Alder, al'der, a genus of trees and shrubs. There are twenty kinds of alder in the northern hemisphere. The most ornamental species is a native of Japan. There are four American alders growing ordinarily from eight to forty feet in height.

Alders look very much like willows, but they are closely related to the birches, oaks, and hazels. The surest way to tell an alder from a willow is by the seed. The flat, smooth seeds of an alder are disposed between the scales of egg-shaped or oblong catkins, something after the manner of seeds in pine cones; while the seeds of a willow are clothed with silky down, and are crowded in a pod after the fashion of poplar and cottonwood seeds. Emerson, a close observer of nature, knew the difference well, and wrote:

> I thought the sparrow's note from heaven
> Singing at dawn on the alder bough.

Alder bark is useful in tanning. It furnishes a valuable dye. The English find the wood of the alder durable in water. They employ it for sluices, mill-work, and piling. Like willow, the wood makes valuable charcoal for use in the arts, and especially in the manufacture of gunpowder. The roots of the alder are covered by tubercles formed by bacteria. These colonies of bacteria gather and fix the nitrogen of the air, as in the case of clover, and enrich the soil.

See NITROGEN.

Alderney. See CHANNEL ISLANDS.

Aldershot, al′der-shŏt, a military camp about thirty-five miles from London. It was established in 1855 as a training camp for soldiers. The British government has expended $20,000,000 there. Large barracks and other conveniences enable the military authorities to train troops in the manual of arms and in field manoeuvers, before they are sent away on garrison duty or to the scene of actual war. The presence of a permanent garrison and of large bodies of troops at other times has fostered the growth of a well built town of the same name. Hotels provide for the wants of visitors. Tradesmen of all sorts relieve the soldiers of their spare coin. Population, 30,000.

Aldine, al′dīn, a name given to editions of classics issued by Aldus and his descendants in Venice between 1490 and 1597. The Aldine printing office existed for 107 years. In addition to Greek and Roman classics, the works of Dante, Petrarch, and Boccacio came from the Aldine press,—in all 908 different works. An "Aldine" is prized for the accuracy of the text, and for its beautiful printing and binding.

Alderman, Edwin Anderson (1861-), an American educator, was born at Wilmington, North Carolina, and educated at North Carolina University. Dr. Alderman began a career of teaching immediately upon leaving the university, and has been successively superintendent of city schools at Goldsboro, North Carolina, assistant State superintendent of instruction in North Carolina and professor in the State Normal College. Dr. Alderman was professor of pedagogy at his alma mater for four years, 1892-96, and president from 1896 to 1899. After serving as president of Tulane University for four years, he was elected president of the University of Virginia. He has served as director of the Southern Education Board.

Aldrich, Thomas Bailey (1836-1909), an American writer. He was born at Portsmouth, New Hampshire. He passed part of his boyhood in Louisiana. He prepared for Harvard College, but was prevented by his father's death from taking a course. Instead he entered the counting house of a New York uncle, but not enjoying the work he turned his attention to literature. He was encouraged by Halleck, Holmes, and other literary men. He wrote for *Putnam's,* the *Knickerbocker Magazine,* the *New York Evening Mirror,* edited *Every Saturday,* and, in 1881, he succeeded Howells as editor of the *Atlantic Monthly.* In later years both Harvard and Yale conferred honorary degrees upon him. Aldrich is known best as the author of the famous *Story of a Bad Boy,* a wholesome and charming tale of a real boy who, while he is not exactly a model, is by no means so very "bad." Lowell said of it that he wished the book "had been twice as large." One of Mr. Aldrich's most humorous short stories is *Marjorie Daw.* He has written two volumes of poems, of which the ballad, *Babie Bell,* may be regarded as the gem. His blank verse has won high praise, but

Aldrich himself frankly owned that he preferred

> The lyric,
> Ever on the lip,
> Rather than the epic
> Memory lets slip.

Other quotations are:

> See where at intervals the firefly's spark
> Glimmers and melts into the fragrant dark;
> Gilds a leaf's edge one happy instant, then
> Leaves darkness all a mystery again.

> Who lacks the art to shape his thought, I hold
> Were little poorer if he lacked the thought.

> If my best wine mislikes thy taste
> And my best service wins thy frown,
> Then tarry not, I bid thee haste;
> There's many another Inn in town.

Mr. Aldrich's verse is as faultless in technique as Tennyson's, and shows a Keats-like love of sensuous beauty; but it lacks originality and largeness of imagination.—Bronson.

Aldrich is our master miniature painter in verse. No other American poet has imposed upon himself such rigid restraints of perfect workmanship.—Abernethy.

Aldrich has produced the only uniformly artistic body of verse in the course of American literature.—Albert Phelps.

Ale, a fermented liquor akin to beer. "Ale, as the term is generally understood, is a pale liquor brewed from lightly-dried malt, and abounding more or less in undecomposed saccharine matter and the bitter and fragrant principles of the hop." Ale is a favorite beverage in England, corresponding to the beer of Germany. Formerly homemade ale was brewed under the direct management of the housewife. Ale differs from the stronger alcoholic liquids in that only a small portion of the sugar is changed by the action of yeast into alcohol. If bottled, however, or allowed to stand in a barrel, fermentation is likely to resume. The ale sharpens, cures, becoming mild ale in a few days, pale ale in a month or two, and strong ale in not less than a year. British ales contain from one to eight per cent of alcohol. See YEAST; BEER.

Alembert, ä-lŏn-bêr′, **Jean d',** written also D'Alembert (1717-1783), a noted French scholar. He was a native of Paris. His mother, a court beauty, but an unmarried woman of fashion and lax morals, left him when a babe on the steps of a church. He was found by the police and given to a glasscutter's wife. When he became famous, his real mother made herself known; but Alembert repulsed her with the words, "I know but one mother, the g' zier's wife." Alembert wrote the math matical articles, the introduction, and many biographical sketches for the famous French encyclopedia. In 1722 he was made secretary of the French Academy. He represented the views of Voltaire and his friends. Among investigations of popular interest conducted by Alembert are those which relate to the theory of winds and the precession of the equinoxes.

Alewife. See SHAD.

Aleutian Islands. See ALASKA.

Alexander the Great (356-323 B. C.), son of Philip of Macedon and the Princess Olympias. Philip was a king of wide views. He provided the best possible education for his promising son, employing as a private tutor no less a person than the great Aristotle. Alexander was trained in manly exercises and showed a fondness for Grecian literature, particularly Homer's *Iliad*. He traced a fancied relationship between himself and Achilles and made that hero his model. Alexander was a handsome youth, skilled in the handling of horses, and, according to popular accounts, absolutely without fear. Philip was assassinated 336 B. C., while preparing for a war with Persia. Some accounts have it that Alexander was privy to the crime, being actuated by the double motive of avenging the wrongs of his divorced mother, Olympias, and of desiring to assume charge of the expedition. The truth can never be known.

Alexander succeeded his father at the age of twenty. The accession of a mere stripling to the throne of Macedon was the signal for a general revolt, not only of the ruder tribes, but of the Grecian cities as well. Alexander's subsequent movements have been compared to bolts of lightning. He struck this way and that, reducing his allies to abject submission. Thebes with its temples and palaces he devoted to plunder and destruction, sparing, it is said, the home of Pindar, the poet, for whose odes to the victors in the

various Olympic and Delphian games he had the greatest admiration.

Having set the internal affairs of his kingdom in order, Alexander next turned his mind to the conquest of the world. He decided to prosecute with vigor the campaign against the Persians his father had commenced. He crossed the Hellespont in the spring of 334 B. C. with 35,000 thoroughly disciplined troops. This was before the day of gunpowder. Each soldier carried a shield to ward off the darts of his assailants. The front of each charging phalanx bristled with spears that prevented the enemy from coming within ten feet of the front rank. Although the Persians met Alexander's force with large armies and fought, particularly the nobles, with the most desperate bravery, it is said that he made himself master of Asia Minor with a loss of but 120 men. Mercenary Greek soldiers found fighting in the ranks of the Persian hosts were cut down without mercy.

Alexander's next step was to gain possession of the Syrian coast and of the Mediterranean. At Issus, a narrow plain between the mountains and the sea, he met King Darius in person at the head of a large army. The very narrowness of space enabled the Grecian phalanx to sweep this force before them. Darius fled to organize another army and make another stand for his life and kingdom.

Alexander now took time to enter Egypt, where he founded Alexandria. He laid siege to the ancient city of Tyre. In the following October, 331 B. C., Alexander's army met and routed a vast host, the last army of the Persians, in the battle of Arbela. This settled the fate of the Persian empire and made Alexander master of the eastern world. Babylon, Susa, Ecbatana, and Persepolis, the ancient capitals of the East, with their war chests and enormous hoards of treasure, fell in time into his hands.

During the next six years Alexander carried the arms of Greece eastward to the shores of the Indus. He established a series of seventy walled towns with paved and lighted streets, reaching from Greece to the farthest limits of his conquests. Garrisons of soldiers were placed in each post, and traders with their caravans were encouraged to trade and travel in security. In one sense of the word Alexander's conquest was a laying hold of the entire trade of the east,—the monopolizing of the caravan traffic between the Mediterranean Sea and the Orient. Goods passing to or from China, India, Afghanistan, Persia, Egypt, Asia Minor, and Greece were safe from robbery and plunder at the trading posts established by Alexander, and along the routes patrolled by the soldiers of Greece. A period of immense wealth and commercial prosperity followed the policing of the eastern world in accordance with Alexander's large plans.

In the midst of all his calculations for further conquest and a still more universal commercial supremacy, including, it is thought, the subjugation and the policing of China, Alexander died in a drunken orgy at Babylon, at the age of thirty-three. The story of his love for his mother; his boyhood; his war horse, Bucephalus; his affection for Aristotle, to whom he never ceased to send new plants and animals, curious shells, and other articles of interest picked up during his campaigns; his admiration for Homer; the cutting of the Gordian knot; the siege of Tyre; his humane treatment of Darius and his unfortunate family; his handsome face and licentious life, and his vast plans for a world organization of industries and commerce into one thoroughly governed and protected system—are full of interest and would require volumes for their complete discussion. Scholars are just beginning to appreciate the tremendous significance of the Grecian conquest of the eastern world.

At Alexander's death the empire fell into fragments, three of which were considerable kingdoms. Alexandria became the capital of Egypt; Antioch of Syria; Athens of Macedonia. Of the smaller fragments, Rhodes and Pergamus were centers of culture. Alexander's body lies in a mausoleum at Alexandria.

See PHILIP (of Macedon); MACEDONIA; PHALANX; GORDIAN KNOT; ALEXANDRIA

Alexander I (1777-1825), emperor of Russia. In 1801 Alexander succeeded his father, Paul, on the Russian throne. The history of Alexander is intimately connected with that of Napoleon. In 1805 he joined Great Britain, Austria, and Sweden in a coalition against France. This combination was hit hard by the great battle of Austerlitz, December 2, 1805. Alexander led his shattered army home. After the disastrous battle of Jena, October 14, 1806, Alexander met Napoleon on a raft in the river Niemen and agreed to the treaty of Tilsit, which was signed July 7, 1807. Alexander agreed to give Napoleon a free hand in the west, and Napoleon was to allow Alexander to extend the territory of Russia in the east. Neither was to join a combination against the other. Five years later, however, Alexander joined his old allies against France. This resumption of hostilities aroused Napoleon's ire, and led to the assembling of the greatest army that France had ever sent forth. The story of Napoleon's invasion of Russia, the burning of Moscow, and the humiliating retreat of Napoleon, form one of the most interesting chapters of modern history. Alexander participated in the final campaign against France, and was one of the monarchs who entered Paris in 1814 at the head of 150,000 men. Alexander was a party to the Holy Alliance. During the closing years of his reign Alexander did much to improve the internal conditions of his vast dominions. In this respect he ranks with Peter the Great. He prepared the way for the abolition of serfdom, encouraged the opening of schools and better methods of tillage, and sought to secure the spread of manufactures and the extension of commerce. He made St. Petersburg a center of literature and fine arts. He was succeeded by his second brother, Nicholas I.

Alexander II (1818-1881), emperor of Russia. He succeeded Nicholas I in 1855. He began his reign with progressive ideas. Though bitterly opposed by the nobles, he completely emancipated the serfs by edict, March 2, 1861. He reorganized the Russian army, and is given credit for important reforms in departments of administration and justice. He introduced trial by jury. He gave the press more freedom, and allowed the universities greater liberty. The professors and students were allowed a degree of free speech hitherto unknown in Russia. As might be expected, a spirit of radicalism took root rapidly. It grew too fast to please the emperor. He lacked the nerve to go on with the work he had begun. He began to hesitate, then to withdraw some of the privileges he had granted. The Nihilists began to attack him. He instructed the police to stop the spread of socialistic doctrines, especially among working men. The police took severe measures. Meetings were broken up with barbaric cruelty. The Nihilists took up the issue, and finally Alexander was assassinated by them in St. Petersburg, March 13, 1881. A dynamite bomb took his life away on the very day before he had purposed issuing an edict granting some of the popular demands. He was succeeded by his son Alexander III.

Alexander III (1241-1286), king of Scotland. He ascended the Scottish throne in 1249. Alexander was betrothed in infancy to the daughter of Henry III, king of England. The marriage was hastened for state reasons, and was celebrated in York Christmas Day, 1251, when Alexander was but ten years old. During Alexander's minority the kingdom was managed by nobles, who strove for the position. In 1260, while at the court of England, his daughter Margaret, afterward the wife of Eric of Norway, was born. In 1263 the battle of Largs freed Scotland from an invasion led by Haco, king of Norway. Alexander's administration of his kingdom was energetic and far-seeing. He improved the condition of the Scottish people, enforced justice in the collection of taxes, and repressed violence in every direction. He was killed March 12, 1286, by a fall from his horse while riding on the coast near Edinburgh. The independence of Scotland received a severe blow in Alexander's death. His immediate successors were not able to cope with the superior strength and craft of England.

Alexander, John White (1856-1915), an American artist. He was born at Allegheny City, Pennsylvania. His first public work was in connection with the Art Department of Harper and Brothers. Later he studied abroad, his paintings attracting attention about 1893. In 1897 he received the gold medal of the Philadelphia Academy of Fine Arts, and in 1900 gold medals at the Paris Exhibition. His pictures appear in many European and American collections. In the east hall of the Congressional Library at Washington six lunettes are filled with Alexander's work, the series representing *The History of the Book,* reproductions of which are found most appropriately in many public and school libraries of the country.

Alexander's Feast, an ode for St. Cecilia's day, written by John Dryden in 1697. See DRYDEN.

Alexander Severus, Roman emperor from A.D. 222 to 235, was the cousin, adopted son, and successor of Heliogabalus. He was well educated and kindly, and governed laudably in peace and war. He defeated a Persian host under Artaxerxes, but was never wholly successful in curbing his own mutinous praetorian guards. During an expedition into Gaul to suppress the Germans, he and his mother were murdered during an uprising of his Gallic troops, headed by a Thracian legionary, Maximinus, who succeeded Alexander as emperor.

Alexandria, a seaport city of Egypt, situated on the Delta of the Nile. It was founded by Alexander the Great, and named for himself, 332 B. C. After the death of its founder, Alexandria became the seat of the Ptolemies, and was adorned with great magnificence. The ancient city was about fifteen miles in circumference, and was intersected by two main streets, crossing it at right angles in the center, thus dividing the city into four quarters. These streets were lined by magnificent colonnades, running their entire length. There were many noted buildings. The museum was a sort of university in which learned men were maintained at public expense. The Alexandrian Library was the most noted in the world. An emporium or exchange was built for the convenience of caravans and of the merchants who came to Alexandria by sea from all parts of the world. The Necropolis, the most magnificent burial ground of antiquity, lay west of the city. A race course with seats for spectators was built on the opposite side. Of numerous imposing monuments, Pompey's Pillar, a shaft of red granite seventy-five feet high, still stands; two obelisks known as Cleopatra's Needles lay half buried in the sand for centuries. One of them now stands on the Thames embankment in London, the other has been set up in Central Park, New York City.

The population of ancient Alexandria is variously estimated; but, in the time of its greatest prosperity, it is thought to have included 600,000 inhabitants, half slaves, half free. Under the Ptolemies it ranked with Rome and Antioch

A modern city, built farther into the sea than the old one, now contains a population of about 400,000 Arabs, Turks, Jews, Copts, Greeks, and people from western Europe. The European part of the city is well paved and is lined with attractive hotels, cafés, stores, and places of business. The city is connected by canal and railroad with the Nile and the Suez Canal. A harbor, artificially protected by a mole costing $10,000,000, is the finest on the Mediterranean. In place of the old Pharos, one of the seven wonders of the world, a modern lighthouse, whose beams may be seen twenty miles at sea, lights the way into the harbor. The student should therefore bear in mind two cities: one, an ancient, magnificent Alexandria, the seat of government of the Ptolemies, the home of the Alexandrian Library and philosophy, the resort of caravans; the other, a modern commercial city, the metropolis of a new Egypt, and an eager sharer in the commerce that passes through the Suez Canal.

When Alexander reached the Egyptian military station at the little town or village of Rhakotis, he saw with the quick eye of a great commander how to turn this petty settlement into a great city, and to make its roadstead, out of which ships could be blown by a change of wind, into a double harbour roomy enough to shelter the navies of the world. All that was

needed was to join the island by a mole to the continent. The site was admirably secure and convenient,—a narrow strip of land between the Mediterranean and the great inland Lake Mareotis. The whole northern side faced the two harbours, which were bounded east and west by the mole, and beyond by the long, narrow, rocky island of Pharos, stretching parallel with the coast. On the south was the inland port of Lake Mareotis.—R. S. Poole, *Cities of Egypt.*

Let us not forget the vast number of strangers from all parts of the world whom trade and politics brought there. It was the great mart where the wealth of Europe and of Asia changed hands. Alexander had opened the seaway by exploring the coasts of Media and Persia. Caravans from the head of the Persian Gulf, and ships on the Red Sea, brought all the wonders of Ceylon and China, as well as of Further India, to Alexandria. There, too, the wealth of Spain and Gaul, the produce of Italy and Macedonia, the amber of the Baltic and the salt fish of Pontus, the silver of Spain and the copper of Cyprus, the timber of Macedonia and Crete, the pottery and oil of Greece—a thousand imports from all the Mediterranean—came to be exchanged for the spices of Arabia, the splendid birds and embroideries of India and Ceylon, the gold and ivory of Africa, the antelopes, the apes, the leopards, the elephants of tropical climes.—J. P. Mahaffy, *The Story of Alexander's Empire.*

Alexandria, Va., is beautifully located on the west bank of the Potomac, 6 miles below, and in view of, the National Capital, with which it has hourly rail and ferry connection. The original name was Bellhaven. The city has a fine harbor, accommodating vessels of heavy tonnage. It contains some important manufacturing establishments, one of them the largest steam pump factory in the United States. Alexandria was the home town of George Washington. The census of 1920 gave the population as 18,060.

Alexandrian Library, The, one of the earliest and most noted libraries in the world. It was formed during the rule of the Ptolemies. The books were kept in the museum and in the temple of Serapis of Alexandria. The museum was a sort of university, in which librarians and other noted men, maintained at public expense, gave their lives to gaining and dispensing knowledge.

The Alexandrian Library contained probably the largest collection of books before the invention of printing. The volumes, or rolls, which must have had somewhat the appearance of rolls of wall paper, reached the enormous number, it is claimed, of 400,000, some authorities say, 700,000. These volumes, it must be remembered, were only written manuscripts, several being required often for a single work. For instance, the *Iliad* was contained in twenty-four volumes or rolls, instead of the single printed book of the present day. Different editions of the same book were made by scribes, who copied them carefully by hand, a process requiring much time and patient labor. Illumined volumes, the pages of which are as carefully executed as copper engravings, are to be seen in European libraries.

A large part of the library was burned during the siege of Alexandria by Julius Caesar; but it was replaced by a new collection from Pergamus, presented by Mark Antony to Cleopatra. The library again increased. The Serapion, or temple of Serapis, in which the volumes were kept at this time, was destroyed, 391 A. D., by a mob of fanatic Christians led by Archbishop Theophilus, with the permission of the Emperor Theodosius. Most, if not all, of the books were destroyed with it. Nevertheless, this is the library which the Mohammedans have been accused of burning about 640 A. D., when the Arabs conquered the city. A story runs to the effect that the Arabian caliph, when asked to preserve the library, replied that, if the books contained only what was in the Koran, they were unnecessary; and if they contained anything else, they were false and ought to be burned; so they were used for fuel for the baths of the city.

See LIBRARIES; EUCLID; PTOLEMIES.

Alexandrian School, a term used with various and somewhat vague significations. In its most specific use it is applied to a school of Christian theology, the origin of which is unknown but which flourished in Alexandria during the early centuries of the Christian era. It was a catechetical school, that is, instruction was given by means of question and answer. Pantaenus was one of its most notable instructors; and the names of the Christian philosophers, Origen and Clement of Alexandria, are associated with it. Clement, who is re-

garded as one of the fathers of the Christian church, succeeded Pantaenus as head of the school.

With scholars, however, the term Alexandrian School means something more than this catechetical school of theology. It stands for nearly a thousand years of intellectual activity,—for the tendencies, not in theology alone, but in literature, science, and philosophy, which characterized the period from Ptolemy Soter (who reigned 306-285 B. C.) to the middle of the seventh century A. D. When used in this way the word school does not mean what it does when we say the school of Stoics for instance. The Alexandrian School was not a company of persons united by belief in the same theories or principles. It was rather a period of advancement in thought and learning. Making use of the term, then, in this sense, the Alexandrian School falls naturally into two divisions, some say two Alexandrian Schools, the first extending from the beginning of Ptolemy Soter's reign, 306 B. C., till the Roman Conquest, about 30 B. C., the second from 30 B. C. until 641 A. D., when the city was conquered by the Arabs. The first of these periods is characterized, naturally enough, by Greek influence, and is spoken of as the School of Science and Literature.

In Ptolemy's Museum the greatest scholars from all countries lived, supported by public funds, and spent their time in study and research. Their literary work has not the quality of originality. The great works of Greece were the natural expression of a free people. Although imitated at Alexandria the spirit of the earlier writers was lacking. Moreover, supported by an absolute monarch, these writers felt, perhaps unconsciously, their limitations. We find, therefore, few works that are really great from a literary point of view. Epic, lyric, and elegiac poetry was produced, however, and dramatic poetry to some extent, while scholars wrote their learned treatises in poetic form and spent much time on grammar, prosody, and exhaustive criticisms. Mathematics and physical science were favorite subjects, in which progress was made. Names noteworthy in this period are those of Callimachus, librarian and poet; Euclid, the mathematician; Hipparchus, founder of mathematical astronomy; and Theocritus, the Roman, the greatest poet of that era.

The second period or second Alexandrian School may be called the School of Philosophy. From this time literature proper is Roman instead of Alexandrian, the intellectual forces in Alexandria turning to philosophy rather than to poetry or science. Influences were strangely mingled, the reasoning of the refined and imaginative Greek, the practical, positive Roman, the visionary, idealistic Jew, the mystic Hindu, all brought to bear upon pagan philosophy and the new teachings of Christianity. The outgrowth of this movement was Neo-Platonism, a name sometimes given to Alexandrian philosophy as a whole. The word Neo-Platonism means a new late Platonic philosophy, and the chief characteristic of the movement was the attempt to reconcile Greek philosophy with the teachings of Christianity. In other words, the Alexandrian philosophy may be described as Christian truth modified by philosophic speculation. Of this movement the catechetical school mentioned at the beginning of this article was a part. See Alexandria; Origen; Theocritus.

Alfadur, or **Alfadir,** äl-fä′dir, all-father, in Norse mythology, an appellation of Odin, as the supreme god of all mankind. See Odin.

Alfalfa, or **Lucerne,** a forage plant. It is a perennial, and is related closely to the clovers. Alfalfa is native to southwestern Asia, where it was in use centuries before the Christian Era. It followed lines of travel westward into the Mediterranean countries, reaching Spain with the Saracens in the eighth century. Alfalfa is a Spanish word, derived, in turn, from an Arabic word meaning, it is said, the best sort of fodder. The plant was introduced into the eastern part of the United States from Europe as lucerne, a name derived from the canton of Lucerne, Switzerland. Alfalfa, under the Spanish name, was introduced into California from Chile about 1854. The Spanish or western name is now universal.

Alfalfa is an upright plant with stems from one to four feet high. A cluster of these stems grows from a spreading crown. The flowers are usually purple, with petals shaped like those of the pea. The pods are coiled in two or three spirals. The seeds are kidney shaped. The roots penetrate from four to twelve feet, enabling the plant to grow in dry places. In practical farming it is found advantageous to split the crowns with a disk plow in order to produce finer stems.

Alfalfa prefers deep, rich, mellow, well drained soil; but it has proved to be a plant of wonderful drouth-resisting powers. It may be raised on sandy or even gravelly soil, where ordinary forage plants die. Much attention has been given to improved varieties. Mr. N. E. Hansen, of the South Dakota Agricultural College, has been instrumental in the introduction of a hardy variety from the drier, colder parts of Turkestan. This variety has the power of withstanding severe frost. It has been found that seed matured in the semi-arid states, particularly Utah, without irrigation, produces plants capable of withstanding extreme drouth.

Alfalfa production in the United States in 1919 was as follows:

State	Tons	State	Tons
Kans.	2,488,156	Ky.	81,298
Nebr.	2,219,549	Minn.	115,327
Colo.	1,779,005	Pa.	64,326
Calif.	2,412,554	Miss.	65,354
Idaho	1,741,165	Va.	50,472
S. D.	763,316	Tenn.	33,237
Mont.	586,683	N. J.	35,576
Utah	748,949	Md.	25,142
Okla.	680,446	Ala.	13,105
Wyo.	514,168	La.	17,224
Wash.	655,876	Me.	11,844
Ore.	592,640	W. Va.	9,122
Iowa	438,338	N. C.	5,769
Mo.	365,036	Ga.	5,412
N. Y.	257,785	S. C.	5,896
Nev.	330,999	Del.	4,780
N. M.	278,595	Vt.	3,914
Ariz.	337,622	Mass.	2,604
Ohio	187,904	Conn.	2,520
Ill.	214,670	N. H.	707
Mich.	118,571	R. I.	304
Wis.	149,929	Fla.	35
Ind.	107,485		
Ark.	128,147	Total	18,864,033
N. D.	75,348	Acreage	8,629,111
Tex.	137,043		

Alfalfa is a plant of growing importance. With fodder corn, timothy, and clover, Eastern farmers have had an abundance of forage. Like red clover, alfalfa has failed in many fields for want of inoculation with the bacteria necessary to the vigorous development of the plant. It has remained for the West to demonstrate that alfalfa is one of the great forage plants.

To get the best results, alfalfa should be cut just as it comes into bloom. It is important that it should not be allowed to dry until brittle. In that case the leaves, which contain about sixty-three per cent of the value of the plant, are likely to be lost. Where alfalfa does well at all, it may be cut two or three times during the season. Professor Coburn says that "in California and elsewhere, it has produced in a season, under the most favorable conditions, with irrigation, six to nine cuttings, and, in Oklahoma, without irrigation, has allowed nine cuttings, averaging one and one-half tons per acre of cured hay."

The yield varies greatly, according to locality, soil, and season. From two to ten tons per acre are reasonable limits.

Alfalfa has high feeding value. Like clover and pea straw it is rich in protein. Of late mills have been established for grinding alfalfa hay into meal. This meal is put up in sacks and used extensively by careful feeders to make up a "balanced ration." Alfalfa meal is an excellent feed for milch cows and horses. It is the best substitute that has been found for green food for poultry.

Like other farm crops, alfalfa has its enemies. The golden, thread-like stems of the dodder suck the life out of it. Various fungi rot the leaves and stems. The army worm and grasshopper are particularly fond of alfalfa leaves. Striped "gophers" and prairie dogs do great damage. Thousands of acres of alfalfa have been destroyed completely in the Humboldt Valley by rapidly multiplying colonies of field mice. See CLOVER.

Alfheim, älf'hīm, in Norse mythology, the domain of Freyr, the sun god, and the abode of the Elves of Light. The Elves of Light were beautiful, shining spirits, more brilliant than the sun. They loved the

light, were friendly to mankind, and usually appeared as lovely children.

Alfieri, Vittorio, Count (1749-1803), the greatest of the Italian dramatic poets. He was born as Asti, in Piedmont. In the splendid autobiography he left, he speaks of four periods in his life: the period of "vegetation"; of "uneducation"; of "dissipation"; and of "production." His chief interests were, in the order named, literature, love and fine horses. An adequate fortune permitted travel and study at will. In 1775 his first tragedy, *Cleopatra,* was produced. The complete edition of his works is in 22 volumes. Important among his tragedies are *Virginia, Oreste, Don Garcia, Saul* and *Timoleone.*

Alfonso XIII. (1886-), king of Spain, the son of Alfonso XII. and Maria Christina, Archduchess of Austria. Alfonso XII. died before his son's birth, and the mother acted as regent until May 17, 1902, when the young king took the oath of office. Since that time the disturbed conditions which existed in Spain during the regency have given place gradually to order and prosperity. King Alfonso married in 1906 the Princess Ena of Battenberg, a grand-daughter of Queen Victoria. An heir to the throne was born in 1907, followed by five other princes and princesses. An attempt upon Alfonso's life was made in 1913 by an anarchist, who shot at him but only wounded his horse. Alfonso, while maintaining strict neutrality during the World War, gave valuable aid to the allies by his intervention in behalf of prisoners of war. He also exerted himself throughout the war to determine the fate of men reported "missing."

Alfonso is a patron of sports of all kinds, and is a very popular monarch.

Alfred the Great (849-901), king of the West Saxons. He was born at Wantage in 849, and was buried at Winchester, October 28, 901. In his youth Alfred was educated at Rome and resided for a time at the French court of Charles the Bald. He was crowned by the West Saxons in 871. Alfred came to the throne in troublous times. The Danes were pressing into Wessex, and he was obliged to battle with them for the very life of his people. Disasters came one after another, but Alfred was a man of the utmost determination and was full of resources. At one time he was obliged to retire with a handful of followers to an island in the marshes of the interior.

After various fortunes of war, the Danes were brought to terms. They agreed to remain on the easterly side of Watling Street, a road running from London to Chester. In time they became vassals of the kings of Wessex. Guthrum, their king, and thirty chiefs were baptized. Alfred stood sponser for Guthrum and gave him an English name. The Danes made little more trouble. This arrangement left Alfred in full control on his own side of Watling Street. He proceeded to combine various petty states into one Saxon kingdom, a work that was continued by his son, Edward the Elder. Alfred succeeded in giving all southern England a semblance, at least, of real nationality. For his day and age he appears to have had remarkable foresight. He foresaw that his kingdom was likely to be attacked by Danes and other adventurers. He showed the people that permanent freedom from invasion for the kingdom could be secured only by the building of ships with which to meet future invaders on their own element. This was the beginning of the British navy.

Apart from a few noble poems, notably of Caedmon, and the ballads and battle songs and fireside stories of the people, the literature of the day was wholly in the Latin language. Alfred himself translated a number of valuable works into English, and encouraged others to do the same. Volumes of history and religious teachings were in this way made accessible to the people in their own language. This was the beginning of English prose.

As a leader of troops amid difficulties, as a far-seeing statesman, a wise and just ruler, a friend of the people, a patriot, a scholar, and as a man, Alfred may be regarded justly as one of the eminent men of England, fully entitled to the name of "The Great" which has been assigned him, not by those who knew and loved him, but by modern writers. In his own

day Alfred's title was "The Truth Teller." In the troublous days of Norman invasion and of Norman oppression he was remembered as "England's Darling."

Behold a pupil of the Monkish gown,
The pious Alfred, King to Justice dear!
Lord of the harp and liberating spear;
Mirror of Princes!

Algae, ăl′je, one of the lower orders of plants found almost exclusively in water, and from which it is probable all other plants have developed. They are distinguished from fungi in that they contain the green coloring matter known as chlorophyll, making them capable of preparing their own food. In size the algae vary from single cells to the giant kelps, rivalling in size and beauty a tropical forest. These are commonly called "seaweeds." Many of them have a commerical importance, some algae being edible, others furnishing iodine and bromine, while in certain localities algae are used as fertilizer. The twelve thousand species are classified as to color in four great groups, the blue-green and the green, to which the fresh water forms belong, and the brown and the red, mainly confined to salt water.

Al′geci′ras Conference. This conference of European powers concerning Morocco affairs was held in January 1906, at Algeciras, Spain, opposite Gibraltar. France, Spain, and Great Britain had entered into an agreement concerning the trade control of Morocco, to which Germany objected. The relations between France and Germany became so strained over the situation that war was narrowly averted. At this conference, participated in by representatives of all the powers concerned, certain concessions were made and Germany was satisfied by the signing of what was designated as a "General Act," providing for a state bank at Tangier, for an open door as regards trade, for the control of the police, and the suppression of illicit traffic in arms. A matter of interest in connection was the criticism of our government by the newspapers of Europe for sending delegates to represent the United States at the conference, citing it as an example of inconsistency in view of the Monroe Doctrine. President Roosevelt's enemies also made use of it in an effort to discredit him.

Algebra, a branch of mathematics. Sir Isaac Newton aimed to indicate at least the origin of the subject by calling it "Universal Arithmetic." Of the several differences between arithmetic and algebra, two may be mentioned. Arithmetic stops at zero; algebra goes farther. If we count backward in arithmetic, we say four, three, two, one, zero; here arithmetic stops. In algebra we may continue: four, three, two, one, zero, minus one, minus two, minus three, and so on indefinitely, using minus to indicate quantities on the other side of zero. In algebra the signs + and — have been adopted to indicate the positive and negative quantities, as they are called. The quantities that correspond to arithmetical quantities are known as positive. Those of the opposite nature are called negative.

The nature of algebraic quantities may be illustrated further by reference to multiplication. If we use the terms of a descending series for multiplicands and employ a constant multiplier, we shall find that our products also form a descending series, and that they run into negative numbers, as for example:

3	2	1	0	—1	—2
2	2	2	2	2	2
—	—	—	—	—	—
6	4	2	0	—2	—4

Lest a false impression be given, it should be remembered that —2, for instance, is not to be regarded simply as two less than nothing. We may illustrate from the idea of property. A man who has nothing has zero. A hundred dollars more than zero is property. A hundred dollars less than nothing is a debt, and a debt is not only something, but it is a serious consideration. In the same way —2 is a real quantity.

We may take a negative quantity for multiplicands and use the terms of a descending series for multipliers:

—3	—3	—3	—3	—3	—3	—3
3	2	1	0	—1	—2	—3
—	—	—	—	—	—	—
—9	—6	—3	0	+3	+6	+9

ALGAE, OR SEAWEED

1. Sargassum or Gulfweed
2. Giant Kelp
3, 4. Sea Otter's Cabbage
5. Sea Colander
6. 18, 19. Devil's Apron
7. Lessonia
8, 9. Rockweed
10, 14. Edible Seaweed
11. Iridaea
12. Constantinea
13. Dumontia
15. Thalassophyllum
16. Odonthalia
17. Irish Moss
20. Delessaria

As the products form an ascending series, we see that the product of two negative factors is a positive quantity.

A second respect in which algebra differs from arithmetic is the consideration of unknown quantities. In algebra we may add, subtract, multiply, and divide quantities without knowing or needing to know what they are. For example:

A farmer sold his sheep for m dollars and gained y dollars. What did they cost him? Ans. $(m - y)$ dollars.

A boy who earns b dollars a day spends x dollars a week. What can he save in three weeks' time?

Ans. $(18b - 3x)$ dollars.

The earliest traces of algebra are found among the Hindus. The following problem illustrates the flowery style of the Hindus:

"The square root of one-half the number of bees in a swarm has flown out upon a jessamine bush, eight-ninths of the whole swarm remained behind; one female bee flies around a male bee that is buzzing within a lotus flower into which he was allured in the night by its sweet odors, but is now imprisoned in it. Tell the number of bees. Ans. 72."

The Egyptians and Babylonians had a knowledge of the elements of algebra. The following problem is from an Egyptian papyrus roll in the British Museum. It dates 2000 B. C. and is itself a copy of some older manuscript at that:

"Heap, its two-thirds, its one-half, its one-seventh, its whole, it makes 97."

The Egyptians seem to have used *heap* for our x to denote an unknown quantity.

The Greeks made progress in geometry, but did not advance beyond other ancient people in algebra. The Arabs gathered up what was known, probably from India as well as the Mediterranean world. Through them the subject was introduced to the western world. About 1228 algebra attracted the attention of Italian scholars. It was in an elementary stage. The most learned had not thought of algebra beyond the simplest quadratic equations.

The earliest printed algebra—in Latin, of course—appeared in 1494. It was prepared by an Italian friar, Lucas de Burgo. The earliest English algebra appeared at Cambridge. It was written by Thomas Recorde. He called his volume "The Whetstone of Wit." The old textbooks seem elementary and crude. The signs $+$, $-$, $\times$, $\div$, $=$, are all modern. Exponents and the symbols for square root are devices that have been adopted later.

It was then the practice among the cultivators of algebra, when they advanced a step, to conceal it carefully from their contemporaries, and to challenge them to resolve arithmetical questions, so framed as to require for their solution a knowledge of their own new-found rules. In this spirit did Ferreus make a secret of his discovery: he communicated it, however, to a favorite scholar, a Venetian named Florido. About the year 1535, this person, having taken up his residence at Venice, challenged Tartalea of Brescia, a man of great ingenuity, to a trial of skill in the resolution of problems by algebra. Florido framed his questions so as to require for their solution a knowledge of the rule which he had learned from his preceptor Ferreus; but Tartalea had, five years before this time, advanced further than Ferreus, and was more than a match for Florido. He therefore accepted the challenge, and a day was appointed when each was to propose to the other thirty questions. Before this time came, Tartalea had resumed the study of cubic equations, and had discovered the solution of two cases in addition to two which he knew before. Florido's questions were such as could be resolved by the single rule of Ferreus; while, on the contrary, those of Tartalea could only be resolved by one or other of three rules, which he himself had found, but which could not be resolved by the remaining rule, which was also that known to Florido. The issue of the contest is easily anticipated; Tartalea resolved all his adversary's questions in two hours, without receiving one answer from him in return.—*Britannica.*

I was just going to say, when I was interrupted, that one of the many ways of classifying minds is under the heads of arithmetical and algebraical intellects. All economical and practical wisdom is an extension or variation of the following arithmetical formula: $2 + 2 = 4$. Every philosophical proposition has the more general character of the expression $a + b = c$. We are mere operatives, empirics, and egotists, until we learn to think in letters instead of figures.—Holmes, *Autocrat of the Breakfast Table.*

Algeria, a district of North Africa. It extends along the Mediterranean from Tunis to Morocco, a distance of 620 miles. The southern boundary is indefinite, but is about 250 miles from the sea, far enough to include the mountain ranges and any

foothills or oases on the south worth the having. A fertile strip from 50 to 150 miles wide, extending east and west near the coast, is called the Tell. South of this is rough, elevated land, devoted to raising sheep and goats, and the gathering of esparto grass much used in paper making. The Tell, which is intersected by fine wagon roads and 2,000 miles of railway, has the aspect of a well cultivated country of southern Europe. Fields of grain and tobacco, vineyards, orchards, lemon and orange groves, and olive trees indicate a fertile and prosperous country. Half of the world's cork and quantities of dates come from the Atlas hills and along the rivers of the Tell. A score or two of mines yield ores of iron, copper, silver, lead, and zinc. The quarries supply building stone and phosphate.

Since 1830 Algeria has been a possession of France. Of 5,000,000 inhabitants, chiefly Arab and Berber, about 300,000 are French. They dominate the industries of the country, though the Berbers who antedate Frenchman and Arab do most of the work. Farm help costs from twenty to forty cents a day. The country sells $60,000,000 worth of goat skins, ore, cork, wine, tobacco, grass for paper, and grain a year. Trade is carried on chiefly with Marseilles.

Algiers, the capital, has streets, public buildings, shops, and hotels, modeled on those of French cities. Ancient Algiers lies farther back, along narrow, dirty, upper streets. The milkman drives his flock of goats from door to door. The houses have thick walls designed to exclude heat. The flat roofs command a magnificent view of a fine harbor and its shipping. The harbor is protected by a long mole of immense concrete blocks, dropped in a curved line to form a defensive embankment.

Algeria is in all essential respects a department of the French republic. There are public schools, both Arabic and French. Freedom of religious worship is secured to all. Newspapers, mails, telegraph and telephone lines disseminate information. Political rights are guaranteed by the privilege of sending three senators and six representatives to the National Assembly of France.

In Roman times Algeria was noted for its fertility. It was called "The Garden of the Empire." Then for centuries, until the French took hold of it, Algeria lay desolate. Considered from a sentimental point of view, it is not right for a strong nation to take possession of the territory of its weak neighbors. But experience has shown that a weak country is better off as the possession of some nation able to enforce the law; at certain stages of progress government is more important than development.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	222,180
Forest area, acres	6,560,232
Population (1921)	5,712,523
Native	4,929,335
European	738,188
Chief Cities:	
Algiers	206,595
Oran	141,156
Constantine	78,220
Bone	45,171
Colonial revenue	$80,000,000
Farm area, acres	124,976,000
Wheat, bushels	41,480,000
Corn, bushels	358,000
Oats, bushels	11,412,000
Barley, bushels	50,491,000
Potatoes, bushels	653,000
Cork, tons	634
Tobacco, pounds	24,650,000
Domestic Animals:	
Horses	202,839
Mules	184,895
Asses	247,808
Cattle	1,092,996
Sheep	9,139,722
Goats	3,793,998
Swine	108,213
Imports	$385,000,000
Exports	$275,000,000
Iron ore mined, tons	1,071,278
Zinc, tons	26,422
Lead, tons	11,633
Coal, tons	6,871
Lignite, tons	1,754
Phosphates, tons	456,169
Wine, gallons	157,136,452
Miles of railway	2,221
Number of schools	1,305
Pupils enrolled	146,508

See BERBERS; ESPARTO; FRANCE; AFRICA.

During the Napoleonic wars, the Dey of Algiers supplied grain for the use of the French

armies; it was bought by merchants of Marseilles, and there was a dispute about the matter which was settled as late as 1829. Several installments had been paid; the dey demanded payment in full according to his own figures, while the French government, believing the demand excessive, required an investigation. In one of the numerous debates on the subject, Hussein Pasha, the reigning dey, became very angry, struck the consul with a fan, and ordered him out of the house. He refused all reparation for the insult, even on the formal demand of the French government, and consequently there was no alternative but war. The expedition launched from the port of Toulon for the chastisement of the insolent Algerine comprised 37,500 men, 3,000 horses, and 180 pieces of artillery. . . . The sea forces included eleven ships of the line, twenty-three frigates, seventy smaller vessels, 377 transports, and 230 boats for landing troops. . . . It was finally agreed that the dey should surrender Algiers with all its forts and military stores, and be permitted to retire wherever he chose with his wives, children, and personal belongings, but he was not to remain in the country under any circumstances. On the fifth of July the French entered Algiers in great pomp and took possession of the city. . . . The spoils of war were such as rarely fall to the lot of a conquering army, when its numbers and the circumstances of the campaign are considered. In the treasury was found a large room filled with gold and silver coins heaped together indiscriminately, the fruits of three centuries of piracy; they were the coins of all the nations that had suffered from the depredations of the Algerines, and the variety in the dates showed very clearly that the accumulation had been the work of two or three hundred years. How much money was contained in this vast pile is not known; certain it is that nearly 50,000,000 francs, or 2,000,000 pounds sterling, actually reached the French treasury. . . . The cost of the war was much more than covered by the captured property. . . . Many slaves were liberated. . . . The Algerine power was forever broken, and from that day Algeria has been a prosperous colony of France.—T. W. Knox, *Decisive Battles Since Waterloo.*

Algonquin, ăl-gŏn′kwĭn, an important and widely spread family of North American Indian tribes. At the time of the discovery of America the Algonquin Indians extended from Labrador to what is now Mason and Dixon's line, and westward, somewhat irregularly, as far as the Rocky Mountains. A further account may be found under the headings of the various tribes, as the Delaware, Chippewa, and Blackfeet Indians. Powhatan, Philip, Tecumseh, Pontiac, and Black Hawk were Algonquins. About 35,000 Algonquins are left in the United States, and about 60,000 in Canada. See INDIANS.

Alham′bra, the ancient palace and fortress of the Moorish kings of Granada. The name, meaning the red, is derived from the red, sun dried bricks used in the construction of the outer walls. The Alhambra is situated on elevated ground overlooking the city of Granada, Spain, and commands a magnificent view of mountains, rolling hills, and valleys. It was constructed by the Moors about one hundred and fifty years before the discovery of America. It was taken from the Moors by Ferdinand and Isabella in 1492. A massive outer wall pierced by gateways and flanked by thirteen towers incloses an area of thirty-five acres. Although fallen into neglect, the gardens are still described as well wooded, and as intersected by shady walks, revealing charming waterfalls and cooling fountains. Singing birds and sweet scented flowers add to the delight of the traveler. A number of government buildings were contained in this area, the chief of which was the Royal Palace. The name Alhambra is applied properly to the entire fortress. The palace of the Alhambra was called by the Moors, Alcazar. This palace consisted of numerous halls and buildings arranged chiefly about two rectangular courts.

The Court of the Fish Pond is about one hundred and forty feet long by seventy-four broad. It receives its name from a pond in the center full of gold fish. The doorways, windows, rows of pillars, light arches, and colonnades about this court have the lightness and grace of palm trees. It is hardly proper to describe their beauty in the present tense, for an earthquake in 1821 and a fire in 1890 have left little of this court to admire. The Court of Lions, somewhat smaller, derives its name from a white alabaster fountain in the center, supported by twelve lions. When this fountain was in order a jet of water rose from its center, fell back into the basin and was discharged through the mouths of the twelve marble lions. The court is entirely surrounded by an arcade or low gallery resting on one hundred and twenty-

four white marble columns. The floor is paved with colored tiles, and the walk beneath the gallery with white marble. The arches, galleries, filigree walls, and the light domes of the roof are composed of open tiling, adorned with stucco work of wonderful lightness and grace. Arches and ceilings seem to hang like cobwebs or gauze in the shape of foliage and arabesques.

Of the many halls that of the Ambassadors is perhaps the most imposing. It is thirty-seven feet square with an arched ceiling seventy-five feet in height. This was the grand reception room where the Moorish monarch sat enthroned on state occasions, such as the reception of foreign ambassadors. The walls are covered with delicate stucco work, the ceiling is inlaid with diversified work of white, blue, and gold, imitating stars set in the heavens. So wondrously is marble, brick, and stucco fashioned and put together, that, seen from the end of a vista, the combination of pillars, arches, windows, and walls has the appearance of lace curtains hung and looped in graceful fashion. Doorways, arches, domes, colonnades, fountains, filigree work, trellised windows, blue, brown, red, and gold colorings, sparkling fountains, soft couches, and the lightness and grace of it all, make the Alhambra a veritable fairyland that stands unapproached in the history of architecture. It is a magic group of palaces, possible only to the same order of minds that created the *Arabian Nights' Entertainments*. Washington Irving's *Alhambra* is considered an excellent account.

Ali Baba, ä′lē bä′bȧ, the central character in the famous Arabian tale of *The Forty Thieves*. He overhears the robbers' password of "Open Sesame," and uses it in their absence to enter their famous cave and despoil it of treasure. Having found who took their treasure, the robbers vowed vengeance, and had themselves conveyed in empty covered jars and set down in Ali Baba's court; but his faithful slave, Morgiana, overheard their conversation and killed them, one and all, by pouring hot oil into the jars in which they were concealed. See ARABIAN NIGHTS; SESAME.

Alibi, ăl′ĭ-bī, a Latin word meaning elsewhere. In law, to prove an alibi is to show that the accused was elsewhere when the crime was committed. An alibi is, of course, absolute proof of innocence. It must be confessed, however, that an alibi is established not infrequently by false testimony, with the purpose of clearing a criminal whose case is otherwise desperate.

Alice's Adventures in Wonderland, a popular story for children by Lewis Carroll (Charles L. Dodgson), a clergyman of Oxford, England. The story was published in 1865. "What is the use of a book without pictures or conversations?" Alice asks, at the outset; and the book recounting her adventures is certainly full of delightful pictures and amazing conversations. It is a humorous tale of a little girl who follows a remarkable rabbit—with a watch in his waistcoat pocket—to a land where she soon "gets used to queer things happening." Sometimes rhymes are introduced in the "conversations," although the words do not always "come the same as they used to do,"

> How doth the little crocodile
> Improve his shining tail,
> And pour the waters of the Nile
> On every golden scale.

See DODGSON.

Alien, āl′yen, one living in a country without becoming a citizen. A German, residing in New York without becoming a citizen, is an alien. An American, similarly residing in Berlin, is an alien. American tourists are aliens while abroad. The Prince of Wales, later King Edward, visited the Centennial Exhibition held at Philadelphia in 1876. While in this country, he was, in a way, an alien.

The term is of Latin origin. Far from meriting the reproach suggested to many minds by the Alien and Sedition Acts of 1798, alien means simply of or belonging to another country,—a foreigner, as distinguished from a citizen. Parentage, not place of birth, decides citizenship. The children of parents residing or traveling abroad are citizens of the same country as their parents.

Custom and treaties between civilized countries accord the privilege of residence, and of transacting business. The right of holding land is sometimes denied to aliens. Aliens of the white race have been encouraged not only to live in the United States, but to become citizens. Naturalized citizens are accorded the same degree of protection as natives. Were a German who had become naturalized, that is to say, who had "taken out his papers," to visit his fatherland, he would be entitled to the protection of the United States flag, quite as though he were the son of our president. In countries having compulsory military service, however, it is generally understood that this protection is not extended to army duty which he may be compelled to give on returning to his native land. In granting naturalization papers to the citizens of some countries, the United States expressly notes this exception. The refusal of England to grant to British subjects the right to become citizens of the United States, and the frequency with which former citizens of Great Britain were forced from American ships to serve in the British navy, was one of the causes of the War of 1812.

In the United States naturalized citizens have all the duties of native citizens and all the privileges as well, save that one, not a native citizen, may not be president, or hold an office by virtue of which he would succeed to the office of chief executive on the death or disability of the president.

In modern nations a citizen is a citizen wherever the flag of his country is the flag of the land. A citizen of Canada, for instance, is not an alien, but a citizen in any part of the British Empire or aboard a British ship anywhere on the high seas. He is an alien in Vermont, but not in London; an alien in Paris, but not in Australia. In modern states an alien is permitted freely to become a citizen. He is required usually to go before a court to declare his intention of becoming a citizen. After a required term of residence, which in the United States is five years, he is then permitted to forswear all allegiance to foreign potentates and powers, particularly the sovereign of his native country, and to take oath that he will support and obey the government of his chosen country. The wife and minor children of one thus naturalized also become citizens. An unmarried woman also may become a citizen on her own account. A woman marrying an alien becomes an alien, even though she continue to reside in her own country. An alien woman marrying a citizen becomes a citizen. Children follow the state of the father. Children of an alien father and a native mother are aliens, even in the land of her birth. Nellie Grant, the daughter of U. S. Grant, who married an Englishman of title, became thereby an alien to her native country, and a citizen of the British Empire. Her children are aliens at the tomb of their distinguished grandfather.

Total aliens in United States in 1920:

Male	2,138,237
Female	2,226,672
Total	4,364,909

Aliens in New York City, 1920:

Male	330,184
Female	441,892
Total	772,676

Among the ancients citizenship was not lightly conferred. The cities of Greece were slow to admit aliens to citizenship. In her colonies and subject provinces, Rome bestowed citizenship as a reward for loyalty, and marked service in the interests of the empire. The inequality of the alien and the citizen in the eye of the law are thus expressed by Portia in Shakespeare's *Merchant of Venice*:

> Tarry, Jew,
> The law hath yet another hold on you.
> It is enacted in the laws of Venice,
> If it be proved against an alien
> That by direct or indirect attempts
> He seek the life of any citizen,
> The party 'gainst the which he doth contrive
> Shall seize one half his goods; the other half
> Comes to the privy coffer of the state;
> And the offender's life lies in the mercy
> Of the duke only, 'gainst all other voice.

See IMMIGRATION; NATURALIZATION.

Alien and Sedition Acts, in American history, a series of four acts passed by Congress in 1798, during the presidency of John Adams. The relations between France and the American govern-

ment were strained. America was full of French refugees who were drawing on the sympathies of the American people to help France in return for the assistance rendered us by that country during the American Revolution. The Republican party, led by Thomas Jefferson, encouraged the French claims. The French Revolution had brought into the Directory of France a number of men lacking not only tact, but a delicate sense of honor. On one occasion the American envoys at Paris were actually told that they might secure an official hearing by paying for it. The Federalist party, then in power in this country, and carrying the actual responsibility for the management of our foreign affairs, became very much incensed against the French. Four acts were passed in rapid succession:

1. A new naturalization law requiring fourteen years' residence instead of five, to become a citizen of the United States, and requiring all aliens, under penalty, to register on arrival in this country.

2. The president was empowered for a term of two years to expel from the country any aliens whom he deemed dangerous, or engaged in conspiracy. This is known as the Alien Friends' Act. Although the president never took advantage of his power, many troublesome Frenchmen left the country in alarm.

3. The president was authorized, in time of war, to drive out all aliens. This is known as the Alien Enemies' Act.

4. It was made a crime to utter a libel against the president, the Congress, or the government. This was known as the Sedition Act. This Act was aimed at individuals and newspapers who were heaping abuse on the administration. It was enforced in a number of cases. Mr. Matthew Lyon, a Republican member of Congress from Vermont, was condemned to pay a fine of $1,000 and was sentenced to four months' imprisonment. The proprietor of the *Vermont Gazette* was also fined and imprisoned.

Some writers speak of the first of the acts named above as a naturalization law, thus reducing the alien and sedition acts to three. The country was full of Europeans whose residence in this country was not of long duration. Although these acts were directed at the French, they gave offense to aliens and their friends of all nationalities. The Republicans, in their desire to obtain power, represented the Federalists in as bad a light as possible. John Adams, as is well known, failed of reëlection. Jefferson and the Republican party came into power.

The whole occurrence has found significance in that the legislatures of Kentucky and Virginia passed resolutions which denounced the alien and sedition laws, and called upon the legislatures of other states to unite in declaring these national acts void. Although no response was heard, the doctrine of nullification may be said to have then made its first official appearance. See NULLIFICATION.

Alimen'tary Canal, the digestive tract. In the simplest form, as in the hydra, it is co-extensive with the body-cavity. In the higher animals the alimentary canal is separated from the body-cavity, and there are various enlargements, divisions, and valves in the way of pouches, crops, gizzards, stomachs, and intestines. The study of anatomy and physiology is much simplified if we bear in mind that all these are but modifications of the simple form. The alimentary canal or digestive tract is a tube extending through the body. In the simpler animals, as in the hydra, the process of digestion is carried on within the body-cavity, and there is no tract or tube especially set apart for this work. In the earthworm, however, the alimentary canal is separate from the body-cavity, and consists of a straight tube which is about the same diameter throughout the body. In the higher animals, as in birds and mammals, the tube is much twisted and doubled on itself, so that it is usually much longer than the entire body. In the higher animals, also, it varies in diameter, because of enlargements into pouches, crops, or stomachs. At certain points growths or organs of various sizes, called glands, are connected with it by means of small tubes called ducts. These glands produce and pour into the alimentary canal fluids and juices which aid in diges-

tion. In man the alimentary canal consists of the mouth, the gullet, the stomach, the large and small intestine, and the rectum. Attached to one part of the intestine is the vermiform appendix, a small blind sac, which, when inflamed, is the cause of the disease called appendicitis. See AMOEBA; CAMEL; BIRD; CUD-CHEWERS.

Alkali, ăl′kȧ-lī, a compound resulting from the decomposition of water by any one of the alkali metals, as potassium, sodium, or lithium. Ammonia has the characteristics of an alkali, and is known as the volatile alkali. The alkalies are all very soluble in water, forming soapy, caustic solutions. They unite with oils and fats to form soaps, neutralize acids forming alkaline salts, change some of the vegetable yellows to brown, and reddened litmus to blue. Common lye, obtained by leaching wood ashes, is an alkaline solution consisting largely of potassium salts. It is used in a number of factories and by the housewife in making soft soap, and for hulling corn. The alkali waters of the Western States contain considerable quantities of alkali salts, chiefly in the form of carbonates or sulphates of potassium and sodium. Large areas of soil, both in the Old World and in the New, are so impregnated with alkali salts as to be practically barren; but recent experiments in irrigation have demonstrated that water and drainage will leach out the salts and convert deserts into fertile plains.

Among the useful plants which subsist on certain proportions of alkali salts in the soil are barley, rice, millet, beets, rape, sunflower, celery, asparagus, spinach, onion, alfalfa, clover, and grape. To this list may be added the date palm of the Old World. Plants require variable small amounts of alkali salts. Water, however, containing ten per cent of alkali material is destructive to vegetation.

So-called spent lye is the liquid which remains after the combination of the alkali and grease in the manufacture of soap. It is of great value for plants. Before its application to the land it is mixed sometimes with peat or turf, or diluted with water. Besides containing potash or soda, this lye contains a large quantity of nitrogenous material.—JULIUS HORTVET.

Al′kaloids, a group of compounds perhaps best described as organic bases. In a narrower sense it is used for those of vegetable origin only, the similar ones found in animals being known as ptomaines or leucomaines. They are widely distributed, are in the main bitter and poisonous, and have no common antidote. For the most part they are very active physiologically, having a special affinity for the nervous system, and should not be used as medicine except upon the advice of a physician. Among the more common ones may be mentioned aconitine, atropine, cocaine, morphine, and strychnine. See PTOMAINE.

Alkoran. See KORAN.

Allan-a-Dale, a young minstrel in the old English ballads. About to be married, his bride is taken from him by her father, and promised to a rich old knight. Allan joins Robin Hood's band. With the aid of the outlaw and his bowmen, the maid is rescued at the altar, and the young couple are married. In Scott's *Ivanhoe,* Allan-a-Dale appears in the character of Locksley's minstrel. Scott has written a poem, also entitled *Allan-a-Dale.*

Allan-a-Dale has no fagot for burning,
Allan-a-Dale has no furrow for turning,
Allan-a-Dale has no fleece for the spinning,
Yet Allan-a-Dale has red gold for the winning.
Come, read me my riddle! come, hearken my tale,
And tell me the craft of bold Allan-a-Dale.

See IVANHOE; ROBIN HOOD.

Alleghany Mountains. See APPALACHIANS.

Allegheny. See PITTSBURGH.

Al′legory, a fictitious narrative, conveying more or less clearly some meaning other than the literal. An allegory may be represented by painting or sculpture, but as the word is commonly used, it is a figure of rhetoric, where language is the medium of representation. The purpose of an allegory is to present some significant fact or moral truth in a forcible manner. An element in its effectiveness is the fact that the real meaning is hidden,—that the reader must fix his attention upon the apparent meaning until he has discovered for

himself the truth concealed therein. The fable and the parable are modified forms of the allegory, usually short and conveying one definite moral. Literature of all nations and of all ages abounds in instances of allegory.

In the eightieth Psalm, the history of Israel is told in a beautiful allegory of a vine "brought out of Egypt." Spencer's *Faerie Queene,* Swift's *Tale of a Tub, Gulliver's Travels,* and Bunyan's *Pilgrim's Progress* are well known examples of the allegory. One of the finest allegories in literature is the cycle of poems called *Idylls of the King* by Alfred Tennyson. In this the literal meaning presents a story beautiful, ennobling, satisfying, but the thoughtful reader finds in each poem some great truth hidden, while the whole presents, it is believed, Tennyson's conception of the life of man, his struggle between good and evil, his relation to his fellow man, and his relation to God.

Allen, Ethan (1737-1789), an American patriot. He was born at Litchfield, Connecticut, January 10, 1737. In 1769 he removed to Vermont, where he became the leader of the Green Mountain Boys. May 10, 1775, he led a force of eighty-three men, among whom was Benedict Arnold, against the British forces at Ticonderoga, where, the story runs, he burst into the quarters of the astonished commander, summoning him to surrender in the name of the great Jehovah and the Continental Congress. This capture gave the Continental armies a valuable supply of artillery, muskets, and ammunition. In September of the same year Allen led an attack on Montreal, but was captured, sent to England, and treated, it is said, with cruelty. He was held as a prisoner until 1788. New York claimed Vermont as a part of its territory. General Allen was foremost in stoutly maintaining its independence. New York at one time declared him an outlaw and offered a reward of $750 for his capture. He was an active, rash, great-hearted man. During his later years he wrote several pamphlets, including a narrative of his captivity in England, a defense of the claims of Vermont, and his views on religious matters. He died of apoplexy near Burlington, Vermont, February 13, 1789. His remains rest beneath a handsome monument in Greenmount cemetery near that city.

Allen, James Lane (1849-), an American novelist, was born in Lexington, Kentucky. He received a private education, and later studied at the University of Transylvania. He soon began to write for the magazines, but did not confine himself exclusively to literary work until 1886, when he went to New York. Mr. Allen has shown a finished artistry, and his stories of the Kentucky "Blue Grass" region are incomparable in bringing to the reader the charm of this part of the United States, as well as the customs—social and otherwise—of pioneer days in Kentucky. Mr. Allen is a social historian, and has done for Kentucky what George W. Cable has done for Louisiana, and Thomas Nelson Page for Virginia. The scenes of his stories are almost invariably laid in Kentucky, and in days to come, his delineation of character and customs will be of much historical value.

Mr. Lane published *A Kentucky Cardinal* in 1895 and *The Choir Invisible* in 1897. These books show the author at his best, for they are written in a way that shows him to be possessed of a rare psychological insight, as well as the art of telling a story in a manner to absorb the reader's attention. Like the Norwegian, Johan Bojer, it is the problems of the soul that most seem to concern him. Among other novels may be mentioned: *Flute and Violin; The Blue Grass Region and Other Sketches; John Gray; Aftermath; A Summer in Arcady; The Reign of Law; The Mettle of the Pasture; The Bride of the Mistletoe; The Doctor's Christmas Eve; The Heroine in Bronze; Kentucky Warblers,* and *Emblems of Fidelity.*

Allenby, Edmund Henry Hyndman Allenby, First Viscount (1861-), a distinguished British field marshal, since 1919 High Commissioner of Egypt and the Sudan. Entering the army in 1882, he served in South Africa before, during and after the South African War, rising to the rank of major-general as early as 1909,

and to that of inspector of cavalry in 1910. At the outbreak of the World War, Marshal Allenby went to France at the head of the British cavalry division. For his services during the retreat from Mons, and later at the advance upon Aisne and the first battle of Ypres, Marshal Allenby won the praise of the allied high command. Advanced to the command of the fifth army corps in 1915, he was later made chief of the third army, which he led for two years. In 1915, he was promoted general and given command of the forces in Palestine and Egypt. In successive engagements he drove the Turkish forces from one position after another, and took the city of Jerusalem in December, 1917. In the following year he pursued the Turks with vigor, and by midsummer all of Syria and Palestine were in the hands of the Allies.

Marshal Allenby was decorated several times, and on the distribution of rewards for service in 1919 he was appointed field marshal, was raised to the peerage, and was awarded £50,000. Later in the same year he was made British High Commissioner in Egypt.

Allentown. The county seat of Lehigh Co., Pa., on the Lehigh River and Lehigh Canal, 36 miles northwest of Philadelphia. It is the second city in the United States in the manufacture of silk and also one of the leading cities in the manufacture of furniture; other industries include steel and cement mills, shoe factories, brick yards and machine shops. The city is served by the Lehigh Valley and other railroads and is the center of a number of trolley lines. The public buildings include the courthouse, high school, hospital for the insane, prison and library. Population in 1920, 73,902.

All Fools' Day. See APRIL.

Alliance, Ohio, an important railroad center for many roads, situated on the Mahoning River, 56 miles southeast of Cleveland. It is in a rich grain growing region, is near an abundant supply of natural gas, and is an important manufacturing city. Alliance, originally named Freedom, was settled in 1838. The present name was adopted in 1851, and a city charter was secured in 1888. Alliance has many manufactories engaged in engraving and making account registers. There are also steel works and manufactories of agricultural implements.

Alligator, a huge reptilian, closely allied to the crocodile. Alligators are at home in the rivers and lagoons of the Southern States from Texas to North Carolina. They have the general shape of lizards, but are more closely related to turtles and serpents. They attain a length of eight to sixteen feet—Old Mose, in New York Zoölogical Park, is twelve feet, five inches long. Alligators have bony plates set in their leathery hides. Their legs are large and strong. Their jaws are armed with terrific teeth.

The female alligator builds a low nest of soil and muck, two feet high and four feet in diameter, on some hot, swampy beach. She lays from twenty to one hundred eggs, all in a single night, and covers them up in the nest with sand. The eggs are covered with hard shells, and are a little larger than those of a mallard duck. She then leaves her eggs to hatch in the heat of the sun, but she lingers about until her young appear. They are lively little fellows about eight inches long, weighing eight or nine to the pound. They make for the water at once. The young gain about a foot in length each year, or about twelve feet in ten years. As winter approaches, alligators bury themselves in mud banks to sleep. They do not freeze, but may be dug out in the winter without signs of life. A few hours in the sun, however, will bring them into activity.

A smaller alligator, six feet in length, lives in the Yang-tse-Kiang of China. William T. Hornaday says of a specimen in his possession: "It so closely resembles our American species, that specific differences are difficult to point out." The Chinese alligator is of a greenish-black color, dotted over with yellow spots.

Alligators differ from true crocodiles in having cavities in the upper jaw for the reception of the long fourth teeth of the lower jaw. Their feet are not completely webbed, and they live much in marshes

and swamps. There are several alligator farms in Florida. Beautiful and expensive leather is made from the hides.

See CROCODILE; GAVIAL.

Allison, William Boyd (1829-1908), an American statesman. He was born at Perry, Ohio, the son of a farmer. Educated at Allegheny College, University of Pennsylvania and Western Reserve College, Ohio, Mr. Allison practiced law in Ohio until 1857, when he removed to Dubuque, Iowa. He was a staunch Republican, and in 1863 was elected to Congress. He was re-elected five times, the last time in 1904. His length of service gave him a great influence. Mr. Allison served on several important committees, and almost every financial measure passed by Congress from 1863 to 1904 was at least partly his work. He was the joint author of the Bland-Allison bill, which provided for the purchase of silver bullion and for the coinage of a specified number of silver dollars each month. Mr. Allison was offered the secretaryship of the treasury by President Garfield and President Harrison. A short time before his death, Mr. Allison was renominated for a seventh term in Congress.

Allit'eration, the repeated use of the same letter at the beginnings of two or more words or syllables in the same line or successive lines of poetry. It was a leading feature in the poetry of Beowulf and other Anglo-Saxon authors, and is still a source of harmony in modern verse. A stanza from Tennyson makes this clear:

The *s*plendor falls on ca*s*tle walls
  And *s*nowy *s*ummits old in *s*tory;
The *l*ong *l*ight shakes across the *l*akes
  And the wi*l*d cataract *l*eaps in g*l*ory.
*B*low, *b*ugle, *b*low, set the wild echoes flying
*B*low, *b*ugle; answer, echoes, *d*ying, *d*ying, *d*ying.

Children are fond of alliteration. "Goosie, goosie, gander," "Bye, baby bunting," and "Peter Piper picked a peck of pickled peppers," are specimens of juvenile alliteration. Peter Poundtext, Wee Willie Winkie, Pied Piper, Tom Tucker, and Simple Simon are alliterative.

See FIGURES OF SPEECH.

Allop'athy, a term originated by Hahnemann, the founder of the homeopathic practice of medicine, and applied by him to the ordinary theory that remedies should be used whose effects are opposite to those produced by the disease. Hippocrates, the "Father of Medicine," as early as 400 B. C., used the expression, "opposites are the remedies of opposites." The term allopathy is not used by its adherents themselves to any extent, as they prefer the designation "regular school." See HAHNEMANN.

Allotropy, a-lŏt'rō-pi, the property possessed by certain chemical elements of existing in two or more forms with identical composition but different properties. It has been thought to be due to a different number or arrangement of atoms in the molecule, as ozone, an allotropic form of oxygen, is known to contain three atoms in its molecule instead of two. Other elements exhibiting this phenomenon are sulphur, silicon, and carbon, the latter strikingly illustrating this peculiarity in the greatly differing forms, charcoal, graphite, and diamond.

Alloway Kirk, a deserted church about two miles from Ayr. It is celebrated in Burns' *Tam O'Shanter,* as the place where Auld Nick fiddled while the witches danced until disturbed by the "Weel done, Cuttysark," of drunken Tam. It is a stone building, still standing, in much neglect, however, about half a mile from the birthplace of Burns. In the churchyard near-by people of various degrees lie buried. The poet's father, mother, and sister lie here. The stone above the father's grave bears the following lines written by the son:

O ye whose cheek the tear of pity stains,
  Draw near with pious reverence and attend;
Here lie the loving husband's dear remains,
  The tender father and the generous friend,—
The pitying heart that felt for human woe,—
  The dauntless breast that feared no human pride;
The friend of man—to vice alone a foe;
  For e'en his failings leant to virtue's side

See BURNS; AYR.

Alloy, a mixture of two or more metals brought about by melting them together. Copper is modified for special purposes by alloying it with other metals. The amount of other metals combined with copper in some of the common alloys

may be stated as follows: Brass contains 30 to 40 per cent of zinc; bronze, 4 to 10 per cent of tin, 2 or more of zinc, and usually some lead; gun-metal, 9 per cent, and bell-metal, 25 per cent of tin; German silver, 20 to 40 per cent of zinc and 10 to 20 per cent of nickel. Among alloys not containing copper, soft solder contains 50 per cent each of tin and lead; pewter, 80 per cent of tin and 20 per cent of lead; type metal, 70 per cent of lead, 20 per cent of antimony, and 10 per cent of tin. The nickel alloy used in coining contains 75 per cent of copper and 25 per cent of nickel. Alloys in which mercury forms one of the components are known as amalgams. Of the common metals, iron is the least miscible with mercury. The principal coins of the United States are alloys of gold and silver with copper. In alloys of the noble metals, the degree of fineness is indicated by "carats." Pure gold is 24 carats fine. Gold 22 carats fine, means 22 parts of gold to 2 parts of some other metal. American, French, and German coins are 21.6 carat, or 90 per cent gold.

All Saints' Day, the first day of November. A feast day of the Roman church, celebrated in honor of all the saints. Called also Allhallows, and Hallowmas. See HALLOWE'EN.

All Souls' Day, the second day of November. It is observed as a feast day by the Roman church. On this day prayers are offered for the souls of all the faithful.

Allspice, the dried berry of the pimento tree. It is also called Jamaica pepper. The pimento is a small tree of beautiful appearance. It grows wild throughout the West Indies, especially in Jamaica, where it is found up to a height of 4,000 feet above the sea. It prefers a limestone soil. The name allspice comes from the notion that the berry combines the flavor of the clove, cinnamon, and nutmeg. As the pimento berry loses its pungency when ripe, the berries are gathered unripe and dried carefully on floors, with frequent winnowing to prevent molding. When dry, the berries are sent to market in bags. Jamaica exports half a million dollars worth of pimento or allspice yearly. It is much used in cookery and to disguise the taste of medicines.

All's Well That Ends Well, one of Shakespeare's comedies. It was first played in 1601. The plot was derived from a story in Painter's *Palace of Pleasure,* taken in turn from the *Decameron* of Boccaccio. Shakespeare follows the original tale closely, although several comic characters are introduced which are his own creation.

The heroine, Helena, whose "pangs of despised love" are expressed with touching tenderness, ranks, despite her defiance of the dictates of maidenly modesty, with the greatest of Shakespeare's female creations.—Sidney Lee.

See SHAKESPEARE.

Allu'vium, a term applied to the sediment deposited by rivers over their flood plains when submerged at times of high water, to the deltas formed at their mouths, or to the fan-shaped heaps of detritus where a river emerges from a narrow valley upon a plain at a lower level. This alluvial soil is the most fertile known, the productiveness of some river valleys, as the Nile, depending wholly upon the new material added after each flood time.

Almanac, a table or calendar of days, giving, together with the day of the week and month, such information as the time of the rising and setting of the sun, the phases of the moon, holidays, fast and feast days, and days to be observed by church and state. Calendars of some sort, called *fasti,* were in vogue among the Romans, and were posted later in the forum for the information of the public. English almanacs, consisting of a square wooden stick about eight inches long, notched along the edges to represent the days and months of the year,—three months on each edge,—were used in England as late as Cromwell's day. Each seventh day was notched deeply to represent the Sabbath. The first day of each month was designated by a broad notch. Saints' days and festivals were marked by colored figures, St. Valentine's day by a true lover's knot, etc. Manuscript almanacs of the twelfth century, one ascribed to Roger Bacon, are preserved in the British Museum and in the libraries of Oxford and Cambridge. Originally almanacs were in-

tended for the guidance of the people in the performance of religious duties. From an early date they foretold eclipses and presaged weather, war, and pestilence, and were filled with superstitions and broad jokes.

In modern times a decided tendency to supply useful information and statistics may be noted. An almanac published by the Society for the Diffusion of Useful Knowledge set an excellent example in 1828, which has been followed very generally since. The *Edinburgh,* the *British,* and *Whitaker's Almanac* are well known abroad. The *Almanach de Gotha,* 1764, printed in French and German, gives details of the princely families of Europe, and various other details and statistics for each country in the world. A nautical almanac published two or three years in advance by the British government is invaluable to the navigator who requires a knowledge of tides and the positions of stars at certain hours, from which to take his reckoning at sea. A similar publication is issued by the United States bureau of navigation.

The first American almanac was published by Wm. Pierce of Cambridge in 1639. *Poor Richard's Almanac,* published by Benjamin Franklin at Philadelphia, is our most noted publication of the kind. Several prominent newspapers, as the *New York World* and the *New York Tribune,* publish almanacs containing a large amount of current and attractive information. The almanacs published for free distribution by makers of patent medicines are characteristic of American business sagacity. One Lowell firm is said to distribute 25,000,000 copies yearly.

See CALENDAR; YEAR.

Alma-Tadema, ăl′mȧ tăd′ē-mȧ, **Laurenz** (1836-1912), a Dutch painter, resident in England. He was born at Donryp, Friesland. While at the Gymnasium of Leuwarden where he received his education, he became interested in archeology, an interest manifested in his paintings, most of which represent ancient Greek, Roman or Egyptian scenes. In 1870 he married an English woman, Laura Epps, who was also an artist. Thereafter they made their home in London. Since that time Alma-Tadema has painted a very large number of pictures whose most noteworthy characteristics are realism, accuracy of detail, and beauty of coloring. Among them may be mentioned *Tarquinius Superbus, Reading from Homer, Entrance to a Roman Theater, An Audience at Agrippa's,* and *Antony and Cleopatra.* This artist won many honors and medals, and was a member of the Royal Academies of Amsterdam, Munich, Berlin, London, Stockholm, Vienna, and Madrid. Mrs. Alma-Tadema's specialty is figure painting.

Almond, ä′mŭnd, a tree and fruit of the rose family. The almond is closely related to the peach and apricot. The tree and flower are like those of the peach and apricot, but the outer portion of the fruit, corresponding to the pulp or eatable portion of the apricot, while fleshy before it ripens, later develops into a dry husk, sometimes as thin as paper, that splits and falls off in early autumn, leaving a soft shell instead of a hard one. Putting the case either way, the almond on sale corresponds to a peach stone. We have no certain history of the almond save that it grew wild in the Barbary States and has been cultivated in southern Europe for centuries.

In Germany and England the almond tree is planted for the sake of its beautiful flowers, which are a delicate pink, and which appear before the leaves in March or April. Almond trees also grow well in northern Africa and in various parts of Asia. In Russia a dwarf almond is common on the southern plains. In Italy the almond blooms in February, converting the hillsides into a glory of pale-rose and green; for the peasants plant garden vegetables under and between the almond trees, thus taking double toll of air and sun and soil. The seed of the almond ripens before the shell becomes hard and before the fleshy pulp becomes dry. In Italy, therefore, almonds are picked and eaten as early as May and June, although the nuts are not gathered for exportation until July and August, the time depending upon the season. Candied almond is sold as a confection in southern Europe.

Of late California has raised almonds for shipment. In 1901 the census takers reported 1,601,947 almond trees. The shipment for the year was 218 carloads, or nearly 7,000,000 pounds. Almonds bloom so early, however, beginning early in February, that losses have occurred from frosts, and the almond industry in California has had a setback. Almonds are gathered much as hickory nuts are. If slightly stained, they are bleached with sulphur fumes to whiten the shells. If unsightly, they are shelled and put on the market as shelled almonds. A hard shelled almond, the so-called bitter almond, is cultivated for almond oil, which is pressed from the kernels. The flowering almond, a dwarf variety, is cultivated in dooryards as an ornamental shrub.

See NUTS.

Al'oe, a genus of lily-like plants in some respects resembling a century plant. Perhaps fifty different kinds have been described, most of them natives of the Cape Colony region. They are related to the daffodil and the narcissus. Aloes have a mass of long, fleshy, lanceolate, spiny leaves set on a short stem. They are much in demand for decorative purposes, especially in public buildings. The natives of the west coast of Africa make cords and nets of the fibers of the leaves, and a species found in Jamaica furnishes the natives with material for clothing. The "American aloe," or century plant, is not an aloe, but an agave, which see. The aloes of the druggist, the juice of the aloe thickened by evaporation, is an old remedy known to the Greeks in the time of Christ. The juice of one aloe makes a beautiful violet dye. The juice of aloes was used formerly as a preservative in embalming.

See AGAVE.

Alpaca, ăl-păk'ä, an Andean animal of the camel kind. The alpaca is smaller than the llama. It has been domesticated by the Peruvians. It is not used as a beast of burden. Large flocks are raised for the sake of the soft, silky, straight hair which grows to the length of two to eight inches, and is woven into fabrics of great beauty, giving its name to alpaca cloth. The body of the alpaca has somewhat the form of a sheep, but it has a long neck. It is also more active, and carries its head erect. Alpacas are no longer found wild. At shearing time they are driven into stone inclosures. Some of these shearing folds are believed to antedate the invasion of Pizarro. Since 1836 alpaca wool has been a regular article of export to Europe. Fleeces vary in color from white to black. Attempts to rear the alpaca outside of its mountain home in Peru have not proved successful.

See LLAMA.

Alpaca, a lustrous textile, made from the hair of the alpaca. The hair or fiber is fine and glossy, though less so than mohair. It ranges in color from yellowish brown to black. The characteristic which distinguishes it from most wool fiber is that it retains its luster after being dyed. Titus Salt, a worsted spinner in England, was the first to discover the possibilities of alpaca fiber. He found a few hundred pounds lying in a shed on the wharf at Liverpool, where it had been left by some importer who had failed to find a purchaser. Salt experimented with the fiber for some time before he produced a satisfactory fabric. His first alpaca factory was opened in 1854; eighteen years after he had decided that the fiber would prove available in spinning. This fiber or hair, which is from two to eight inches in length, is spun into yarn. With this yarn as a filling, and a cotton warp, a durable, handsome, and dust-defying material is produced. Before spinning, the fiber is sorted into eight grades, each suitable for one class of goods. Most alpaca is woven plain, but it may be brocaded. After leaving the loom, it is washed, dyed, and pressed. Then it is "sheared" to remove any fuzz that may have been raised on the surface. After being washed, dried, and pressed again, it is ready for wrapping. Alpaca varies in quality, its beauty and durability depending upon the fineness or coarseness of the cotton warp and alpaca fiber, and upon the number of theads per inch, the evenness of weave, and the luster. The better qualities are hardly to be distinguished from pure mohair. The luster of genuine alpaca is permanent. A cheaper and less serviceable material resembling,

and often called, alpaca, is made from the fleece of some varieties of sheep. It is a common fashion of late to call all this class of goods mohair. A genuine alpaca garment possesses a gloss almost like silk, sheds dust as well as linen, may be washed without injury, and is easily and successfully pressed. See ANGORA WOOL.

Alpha and Omega, the first and last letters of the Greek alphabet. The expression signifies the beginning and the end—completeness. In Rev. i: 8, the Lord saith, "I am Alpha and Omega." The early Christians were wont to place these two letters on their tombs.

Alphabet, ăl′fȧ-bet, the letters of a language arranged in a fixed order. Prior to the invention of characters to represent sounds, pictures were used to convey ideas. Such systems are still in use. The present writer has seen a representation of this sort on the body of a pine tree at Lake Itasca, stating in a pictorial way that a certain number of Chippewa hunters, with so many tents and guns, had encamped on the spot, and that they had killed a certain number of moose, deer, and small game.

The pictorial writing of Egypt gave rise, it is thought, to the earliest alphabet of which we have any record,—that of the Phoenicians. The Greek, the Latin, the Arabic, and, so far as we know, all eastern alphabets are derived from it. The word alphabet is derived from the Greek names for the first two letters, *alpha* and *beta.* In shape the various letters have undergone changes. The printed alphabets of different nations vary less than their script. That which we use is called the Roman alphabet. Its letters have the simplest shape of any, and are therefore the easiest to read. Early English was printed in an alphabet more nearly resembling that still in use by the Germans. If present indications are a guide, it is safe to assume that the Roman alphabet, with possibly further modifications, will one day become universal. It is used already for nine-tenths of the printed matter now issuing from the press. It is used in both Americas, in England, and her colonies, including India and Australia, and in the so-called Latin countries of the Mediterranean. In Scandinavia and especially in Germany, scientific books are printed in Roman letters.

An ideal alphabet has a separate letter, and one only, for each sound, but no such alphabet is in general use. The Phoenician alphabet contains twenty-two letters; Greek, twenty-four; modern Russian, thirty-five; Arab, twenty-eight; Sanscrit, forty-seven. Our alphabet has twenty-six characters to represent about forty-two sounds. We supply the deficiency in a clumsy way by diacritical marks. In that way the first letter, *a,* is made to represent no less than eight sounds. The result is that there are a dozen possible ways of spelling the syllable new.

See RUNES; HIEROGLYPHICS.

Alpheus, ăl-fē′us, the ancient name of the river Rouphia, or Rufia. It is the principal river of the Peloponnesus, Greece, and empties into the Ionian Sea. A part of its course lies underground and the river was fabled to flow under the sea to Sicily.

In Greek mythology Alpheus was the river-god, and fell in love with a nymph, Arethusa. Pursued by her lover, Arethusa changed herself into a fountain on an island in the harbor of Syracuse, where Alpheus, as a river flowing underground, overtook her, and they flowed united to the sea. We find allusions to this story in the poems of Milton, Hood, Coleridge, and many others. The following quotation from Moore alludes to the pretty Greek custom of throwing wreaths of flowers into the river at the point where it runs below the surface, to be brought forth again where the waters reappear:

Oh, my beloved, how divinely sweet
Is the pure joy when kindred spirits meet!
Like him the river-god, whose waters flow,
With love their only light, through caves below,
Wafting in triumph all the flowery braids
And festal rings, with which Olympic maids
Have decked his current, as an offering meet
To lay at Arethusa's shining feet.
Think, when he meets at last his fountain bride,
What perfect love must thrill the blended tide!
Each lost in each, till mingling into one,
Their lot the same for shadow or for sun,
A type of true love, to the deep they run.

Alpine Plants, a general name for plants of an arctic character. The plants

of Switzerland, from an elevation of 6,000 feet upward, were called alpine by early botanists. Similar plants found on the upper slopes of mountains, as on the Andes from 12,000 feet upward, in Lapland, southern Patagonia, and in arctic countries generally, have the same characteristics and are often identical. They consist for the most part of mosses, flowering plants that develop in a few weeks, some of great brilliancy, dwarf willows two or three inches high, etc. The general term, "alpine," has been extended to all plants of this sort.

Alps, the central mountain mass of Europe. The Alps are a mass of mountains, rather than a chain. Their limits, counting spurs and valleys, are hard to define. There are two general divisions—the Swiss Alps and the Tyrolese Alps. The latter occupy that portion of Austria known as the Tyrol. Geologically the Alps occupy Switzerland and the Tyrol, as well as portions of Germany, Austria, Italy, and France. There are over three hundred peaks, having a height of from 5,000 to 16,000 feet. St. Gothard is considered the geological center of the system. Mt. Blanc, 15,781 feet, is the highest peak.

Owing to its accessibility, no other system of mountains has been studied so thoroughly as that of the Alps. The effect of altitude on animal life and vegetation, barometric pressure, the precipitation of snow and rain by the influence of cool summits on moisture-laden air, the flow of glaciers, the effect of mountains on the freedom-loving spirit of their inhabitants, the building of rack and pinion railways, railway tunnels, the effect of heights on breathing, and on the temperature requisite for boiling water, are only a few of the problems that have been studied in the Alps. No other mountains of equal height and extent are penetrated by so many valleys and gaps, allowing not only the passage of men, plants, and animals in their migrations, but the passage of winds as well. The Alps shelter no desert region cut off from rain. Geologically the Alps have been described as a kernel of granite and gneiss wrapped in a covering of limestone.

A very interesting summary of climatic conditions may be made by a division of the Alps into six regions, largely according to elevation:

1. The olive region. The olive, lemon, and evergreen oak flourish in protected valleys at the southern foot of the mountains and about the Italian lakes.

2. The vine region. Grapes are produced in deep sunny valleys throughout.

3. The region of deciduous trees. The lower slopes of the mountains are everywhere covered with a growth of trees, up to a height of from 4,000 to 5,500 feet above the sea according to exposure. The more heat, the higher these forests. The roads and footpaths wind delightfully through groves of oak, ash, elm, beech, hazel, walnut, and sycamore.

4. The region of coniferous trees. Above the beech line the mountain highways and paths begin to climb more rapidly through spruce, pine, and fir forests. Lofty fir trees rise from the mountain sides and spring from heaps of boulders with apparently no footing beyond the loose rocks which they clutch with their roots, like the talons of an eagle. The roadside inns, farmhouses, and mountain chalets, constructed of hewed fir, turn to a rich brown, harmonizing wonderfully with the scenery.

5. The region of pasture. From 6,000 to 7,000 feet above the sea-level the firs come to an end, and the grassy pastures for which alpine regions are noted begin. Cattle and goats are driven up to the pastures in the summer season and down into the shelter of the valleys and forests for winter. The celebrated Swiss dairy cow is from this region.

6. The region of perpetual snow. Above the pastures comes the snow line from 8,000 to 9,500 feet above the sea. Heavy snows fall even in midsummer, and are packed into glaciers that run down through the pasturage belt, often far into the forest below.

The profusion and ever-changing variety of flowers to be found in the valleys as they rise higher and higher have long made the Alps a botanist's paradise. The grassy heights below the snow line are noticeable

for bright flowers found only in similar localities in the Pyrenees, the Carpathians, or on distant Ararat. This alpine flora, as it is called, includes rare species of the pink, saxifrage, cress, hawkweed, thyme, harebell, primula, violet, and gentian. Many of these, and especially an everlasting known as the edelweiss, grow beyond the range of grass or shrubs, wherever a bit of soil shows among the snow banks.

The valleys of the Alps contain many snow-fed lakes of marvelous clearness. They are well stocked with fish, especially those of the trout and salmon kind that prefer cool water. The Alps have been the last refuge of many wild animals. The ancient urus, or wild bull of the Canton of Uri, has disappeared within historic times. The elk, the wild boar, and the beaver have gone too; but the brown bear of Berne, the wolf, the lynx, and the wildcat still survive. Deer,—red, fallow, and roe,—still roam the forest regions, the shy chamois still climbs the rocks, and the ibex, wilder still, with curved horns haunts the very snow line. A marmot allied to the woodchuck thrives in the stony pastures.

Birds find the Alps a place of shelter for their summer nests. In the forests and uplands are found several species of grouse, including the cock of the woods, ptarmigan, blackcock, and rock partridge. The rock chough, a crow-like bird with a yellow bill and legs, builds on glacial cliffs 10,000 feet above the sea. The snow bird and the snow finch ascend still higher. The lammergeier or lamb-stealer, the alpine eagle, still circles the mountains with long sweep of wing.

Animal life extends higher than plant life. Animals are found at some distance above the line of plants. Beetles and similar species shelter under stones. Naturalists have observed that, while alpine flowers are brilliant, the insects lose color, and many species have been so long afraid to trust themselves in the gusty air, lest they be swept away from their homes, that they have lost their wings altogether. Highest of all are snow fleas. Even spiders are found on rocks 14,000 feet above the sea. Curiously enough, an alpine frog climbs as high as grass grows, and a toad follows closely after. While there is much similarity between the flora and fauna of the higher Alps and those of arctic regions, the climate of the Alps is much more favorable. Day and night, summer and winter, follow in regular succession. In midsummer the alpine day is hot even on an ice sheet. The sun of a midwinter day mitigates the severity of the weather. At night life may seek shelter; but within the Arctic Circle a long, bitter, cold winter night lasts for months without a ray of light or heat.

Alsace-Lorraine, ăl′săs-lŏr-rān′, really two provinces differing widely in history, language, and customs, but whose affection and attachment for France are the same; we should say Alsace *and* Lorraine. The hyphen served Germany as a short administrative expression to denote territory stolen from France nearly fifty years ago, but ordered by the Peace Conference to be returned immediately. In 1921 the provinces had an area of 5,604 square miles. The population was 1,593,549. The land is fertile, rich in iron and coal. Beautiful forests cover a third of it. Wine, grapes, oats, barley, rye, tobacco, wheat, and vegetables are abundant; also dairy products. Manufactured articles are quite as varied.

The largest cities are Strasburg, Metz, Colmar, and Mulhouse. Strasburg has a beautiful cathedral, a wonderful clock, and a great university. In Strasburg the Marseillaise was sung for the first time.

Alsace-Lorraine is situated on the west bank of the Rhine. Germany desired it to strengthen her fortifications, and, desiring it, took possession by force during the Franco-Prussian War of 1871. She pretended an historic right to it dating from the Middle Ages when the territory belonged to Germany, but the people were never German in feeling or customs. They refused to be reconciled to Germany, and when given choice to leave their homes by October 1, 1871, or become German subjects, more than 50,000 preferred to go into exile. The joy of the inhabitants when the Great War restored them to France was unbounded. The two provinces are now three regular French departments

—Strasburg, Colmar and Metz; or Bas-Rhin, Haut-Rhin and Moselle.

Alsiké. See CLOVER.

Altai, al′ ti, Mountains, a lofty mountain system in West Central Asia. The summits are rounded. Byeluka (11,000 feet) is the highest peak. Gold, silver, copper and iron abound, and in the Russian provinces traversed by the system mining is important.

Altar, al′tẽr, among the ancients a structure upon which sacrifices were offered to the gods. As almost every religious act was accompanied by sacrifice an altar was an indispensable part of worship. The first altar of which any record is preserved is the one which Noah "builded unto the Lord" after the flood. The earliest altars were doubtless simple heaps of stones, or sods; later they were often elaborate structures of various forms and sizes. In the temple of Jupiter at Babylon was an altar of massive gold. The altar of peace built in honor of the Emperor Augustus at Rome was of colossal size, and is regarded as one of the masterpieces in art of the Augustan age. Altars were erected commonly in the open air, that the steam of the sacrifice might ascend to heaven. Within the temple altars were built also, and upon them incense was burned and bloodless sacrifices offered. "Altar" is used figuratively to designate a religion, nation, or anything for which a sacrifice is made. The following lines are from Joseph Hopkinson's *Hail Columbia.*

"Let independence be your boast,
Ever mindful what it cost;
Ever grateful for the prize,
Let its altar reach the skies!"

Altgeld, John Peter (1847-1902), an American political leader. He was a native of Germany, but was brought to the United States in infancy. He joined the Union Army at 16, and served until the close of the war. Mr. Altgeld was judge of the Superior Court of Chicago from 1886 to 1891, and was elected Governor of Illinois in 1893, serving until 1897. One of his first official acts was the pardoning of three Anarchists, convicted of complicity in the Haymarket Riot of 1886. This act excited wide comment. He was

"Let independence be your boast,
Ever mindful what it cost;
Ever grateful for the prize,
Let its altar reach the skies!"

Althea. See MELEAGER.

Altitude, in geography the perpendicular height of a locality above the sea-level. The greatest known altitude of any point on the earth's surface is the summit of the Himalaya mountains. The top of Mount Everest rises 29,012 feet above the Indian Ocean. The greater part of the land surface lies below the line of 2,000 feet. High altitudes have much the same effect on climate as that produced by arctic conditions. The temperature falls three degrees for each 1,000 feet of elevation. Even at the equator plant life ceases to exist at a height of 15,000 to 18,000 feet above the sea. The tops of the highest equatorial mountains have an arctic climate without even the short arctic summer.

The highest inhabitated spots in the world are: a mining district in Chile, 18,480 feet above the level of the sea; a mining district in Peru, 16,200 feet, and a monastery in Tibet, 15,200 feet. The highest home of man in the United States is the Pike's Peak observatory in Colorado, 14,250 feet above sea-level.

The following table of altitudes was prepared by a member of the United States Geological Survey, the data being taken from their maps, unless otherwise stated. The height is given in feet. Owing to varying conditions, high altitudes obtained by different parties may vary a few feet.

Alabama, Che-aw-ha Mountain	2,407
Alaska, Mount McKinley	20,300
Arizona, San Francisco Peak	12,611
Arkansas, Magazine Mountain (?)	2,800
California, Mount Whitney	14,501
Colorado, Mount Elbert	14,436
Connecticut, Bear Mountain	2,355
Delaware, 2 summits near Brandywine	440
Dist. of Columbia, Fort Reno, Tenley	421
Florida, near Mount Pleasant Station	301
Georgia, Brasstown Bald Mountain	4,768
Idaho, Hyndman Peak	12,078
Illinois, Charles Mound	1,257
Indiana, near summit, Randolph Co.	1,285
Iowa, 5 miles SE. of Sibley	1,670
Kansas, west boundary, north of Arkansas River	4,135
Kentucky, The Double, Harlan Co.	4,100

Louisiana, summits in western parishes ...	400
Maine, Mount Katahdin (west)	5,268
Maryland, Backbone Mountain	3,400
Massachusetts, Mount Greylock	3,505
Michigan, Porcupine Mountain (?)	2,023
Minnesota, Misquah Hills, Cook Co.	2,230
Mississippi, near Holly Springs	602
Missouri, Tom Sauk Mountain	1,800
Montana, Granite Peak	12,834
Nebraska, Plains in SW. corner	5,300
Nevada, Wheeler Peak	13,058
New Hampshire, Mount Washington	6,290
New Jersey, High Point	1,809
New Mexico, peak 2 miles N. of Truchas Peak	13,306
New York, Mount Marcy	5,344
North Carolina, Mount Mitchell	6,711
North Dakota, south part Bowman County	3,500
Ohio, 1½ miles E. of Bellefontaine	1,540
Oklahoma, SW. corner T. 1 R. 1	4,700
Oregon, Mount Hood	11,225
Pennsylvania, Blue Knob	3,136
Rhode Island, Durfee Hill	805
South Carolina, Sassafras Mountain	3,548
South Dakota, Harney Peak.....	7,240
Tennessee, Mount Guyot	6,636
Texas, El Capitan, Guadaloupe Mountain	8,690
Utah, Mount Emmons	13,428
Vermont, Mount Mansfield	4,406
Virginia, Mount Rogers	5,719
Washington, Mount Ranier	14,363
West Virginia, Spruce Knob	4,860
Wisconsin, Rib Hill (?)	1,940
Wyoming, Mount Gannett	13,785

HEIGHTS OF NOTED MOUNTAINS.

Name	Location	Feet
Aconcagua	Chile	23,080
Ararat.....	Turkey	17,260
Chimborazo	Ecuador	20,498
Dapsang	Tibet	28,278
Dickerman	Washington	15,766
Elburz	Russia	18,526
Everest	India	29,002
Kenia	East Africa	19,500
Kilimanjaro	East Africa	19,600
Logan	Canada	19,539
Mauna Loa	Hawaiian Islands ..	13,600
McKinley	Alaska	20,464
Mercedario	Mexico	22,397
Mitchell	North Carolina	6,711
Mt. Blanc	France	15,780
Pike's Peak	Colorado	14,108
Popocatepetl	Mexico	17,748
St. Elias	Canada	18,024
Shasta	California	14,380
Vesuvius	Italy	4,260
Washington	New Hampshire	6,279
Whitney	California	14,502

Alton, Illinois, an industrial city on the Mississippi river, twenty-five miles north of St. Louis and three miles north of the junction of the Missouri and Mississippi rivers. It is a port of call for numerous lines of steamers and is served by the Chicago & Alton, Big Four, Chicago, Peoria & St. Louis, and other railroads, and by several interurban lines. Manufactories of glass and ammunition are the chief industrial plants, though machinery, agricultural implements and tobacco products are also made. There is a good public school system, an Ursuline convent and a large library. Population, 1920, 24,682.

Altoona. A city of Blair County, Pa., is on the Pennsylvania Railroad, 117 miles east of Pittsburgh and 237 miles west by north of Philadelphia. The railroad shops of the Pennsylvania Company, the largest in the world are here. The Company has co-operated with the public schools in establishing a splendid railroad high school, fully equipped with forge, foundry and woodworking machinery. There are more than fifty churches and two modern hospitals. There is also a mechanics' library of 40,000 volumes, and a public library.

Altoona is an important agricultural and coal-mining center. Population, 60,331.

Alum, a substance which is essentially a double sulphate aluminum and some other element, especially an alkali metal, combined with 24 molecules of water. Ammonium takes the place of an alkali metal in forming one of the alums. The most important alums of commerce are potassium alum and ammonium alum. The crystals are large, white, and transparent, and are soluble in about ten parts of water, giving an acid reaction to the solution. When heated strongly, they lose their water of crystallization and form a substance known as "burnt alum."

Alum is used in tanning leather, in the preparation of size to be used in the manufacture of paper, and as the basis of the mordant or material used for making a permanent dye in the coloring of cloth. It is also one of the essential ingredients in many of the artificial yeasts, or so-called baking powders. The presence of notable quantities of alum or alum residue in bread is likely due to the use of an alum baking powder. Alum is sometimes added to the salt solution used to produce hardness and crispness in pickles. It has been occasion-

ally mentioned as a preservative, but its use for that purpose has not found a wide application. Alum is employed to some extent as a medicine. It is an antidote in acute cases of lead poisoning, and, on account of its astringent action, it is applied to slight cuts to check the flow of blood. Very large doses produce symptoms of poisoning. The white of a raw egg is an effective antidote, as, in coagulating, it combines with the alum and permits of its removal from the stomach by the aid of an emetic.

Aluminum, or **Aluminium,** a silvery white metal about as hard as zinc. It may be hammered into sheets and drawn into wires. It rings when struck, and is a good conductor of heat and electricity. It does not rust in the air, and is harder to melt than silver. Aluminum oxide, known also as alumina, is found in nature as corundum, of which the ruby, the sapphire, and emery are varieties. Alumina is one of the principal ingredients of clay. Aluminum gives its name to alum and enters into a vast number of minerals and soils. It is one of the lightest of metals, and would be used in preference to iron in buildings, were not its separation from clay so expensive. Aluminum is used for the tips of lightning rods. The cap of the Washington Monument, weighing 100 ounces, which is also the tip of its lightning rod, is formed of this metal. Of late aluminum has displaced copper in part as a conductor through which to distribute electricity from power houses. Electricity generated at Niagara is carried by aluminum cables to Buffalo. Thin sheets of aluminum are used as a substitute for tinfoil. The metal is used also for hairpins, thimbles, ferrules, bands for canes and umbrellas, mirror frames, combs, backs for brushes, and many other articles. Bobbins of this metal are not subject to shrinkage. They are lighter than wood. Aluminum was not isolated until 1828, and in 1886 the production in the United States was only 1.5 tons. By 1911 this had increased to 23,062 tons, and in 1920 the production had a value of $41,375,000. It is produced by electrolysis, and its chief ore is bauxite. In the form of alloys it is used in the construction of automobiles, balloons, and airplanes and for other purposes. Its use is being extended as rapidly as the metal can be supplied. See CORUNDUM;

Alva, Duke of (1508-1582), a celebrated Spanish soldier. An able, unscrupulous, cruel man, of whom an excellent account may be found in Motley's *The Rise of the Dutch Republic.* A distinguished general, during the reign of Emperor Charles V, he became the military commander-in-chief of Philip II. Upon being asked at one time to give an account of the money expended in the campaign, he is said to have replied: "If the king asks me for an account, I will make to him a statement of kingdoms preserved, or conquered, of signal victories, of successful sieges, and of sixty years' service." An account of his various campaigns would be a history of the reigns of two monarchs under whom he served. Alva is remembered particularly for the way in which he treated the inhabitants of the Netherlands. He was sent to the Low Countries with an army to subdue a revolt and to exterminate heresy, out of which, it must in justice be said, the revolt proceeded. After a protracted contest Alva and his troops were withdrawn before the victorious forces of William, Prince of Orange. This war cost Spain $800,000,000, her choicest troops, and seven fair provinces. Alva himself boasted that he had caused 18,000 Netherlanders to be beheaded for heretical opinions, though modern writers assert that many were executed for the sake of the wealth they were known to possess.

Amadis of Gaul, an ancient Spanish or Portuguese romance, comparable with the British tales of Arthur and his Round Table Knights. It is thought to have taken form in the hands of a Portuguese writer, himself a knight, about a hundred years before the discovery of America.

For the story itself, it is impossible to give a summary of it—the plot being too disconnected; but he who has read one such tale, or even a few chapters of one, may have a general impression of all—hacking and hewing in every page, knights always at war and seeking adventures, giants in the path, lions in the forest, damsels in durance, castles to be attacked, wizards and witches with hate in their hearts, kings

everywhere plentiful as blackberries, and lovely ladies abounding in tenderness.—Southey.

Amalgam, an alloy in which mercury forms an important constituent. Amalgam is given the name of the material with which the mercury is combined, as gold amalgam, silver amalgam, etc. In addition to the materials just named, mercury combines readily with antimony, platinum, arsenic, bismuth, lead, magnesium, potassium, sodium, tin, zinc, and several other elements of less note. The affinity of mercury for gold is put to a practical use by miners. Some account is given in the article on placer mining of the manner in which the gold-bearing gravel is washed through wooden flumes, in the bottom of which tiny puddles of mercury take up the particles of gold as they roll along, and form an amalgam. A silver and also a copper amalgam is used for filling teeth. An amalgam composed of one part of tin to three of mercury was formerly employed for silvering the backs of mirrors; but it has been replaced of late by silver nitrate. See MERCURY; MIRRORS; ALLOY.

Amalthea, am-al-thē′ä, in Greek mythology, the nurse of the infant Zeus, in Crete. According to one story Amalthea was a nymph and fed the child with goat's milk. Another legend gives the name of Amalthea to the goat itself, and says she suckled the infant. Zeus broke off one of the horns of this goat and endowed it with the power of being filled with whatever the possessor might wish. This horn was called the horn of plenty, or cornucopia, and it was used in later times as a symbol of plenty. There is another story which connects the origin of the cornucopia with Achelous. See ACHELOUS.

Amaranth, a common name for several old-fashioned garden favorites, including cockscomb, prince's feather, and love-lies-bleeding. The word is Greek, signifying everlasting or unfading. The color of the plumes is due to the scales that protect the apetalous, inconspicuous flowers. The scales retain their brilliant color in drying; hence the amaranth is an emblem of immortality. There are some five hundred species, including our coarse pigweed and several tumble weeds. In southern Europe, especially Portugal, the globe amaranth is used in place of holly and ivy for festal and church decorations.

Immortal amaranth! a flower which once
In paradise, fast by the tree of life
Began to bloom; but soon for man's offence
To heaven removed, where first it grew, there grows
And flowers aloft, shading the fount of life,
And where the river of bliss through midst of heaven
Rolls o'er Elysian flowers her amber stream:
With these that never fade the spirits elect
Bind their resplendent locks.

—Milton, *Paradise Lost.*

Amazon, a river of South America, the largest in the world. Its head waters are fed by the perpetual snows of the Andes, a few hundred miles from the Pacific Ocean. It flows in a general north-northeasterly direction, receiving enormous tributaries, and finally discharges its waters into the Atlantic under the equator in a mighty flood 150 miles wide. The Amazon is 4,000 miles long. It has a hundred navigable tributaries. Seventeen of the largest are from 1,000 to 2,300 miles in length. The entire Amazon system affords over 50,000 miles of navigable waterways. In the lower 750 miles of its course, from the mouth of the Rio Negro to the Atlantic, the main river is nowhere less than 180 feet in depth. Other rivers are longer, but of all rivers in the world none equals the Amazon in volume. Roughly stated the Amazon carries to the sea not each hour, but each minute, a volume of water represented by eighty acres fifty feet deep. Its basin, also the largest in the world, covers 1,900,000, some authorities say 2,500,000, square miles, or nearly a third of all South America. From the headwaters of the Amazon, the Indian in his canoe may pass north by connecting streams into the Orinoco or south to the Rio de la Plata.

The entire central and eastern part of the Amazon Valley is occupied by dense forests. Surrounding the forest region toward the west, and lying between its tributaries, are vast savannas or treeless grassy tracts. The waters are thronged with turtles and crocodiles, water fowl, tapirs, and anacondas, and teem with fishes.

Agassiz described 1,163 species of the latter. The forests, impassable jungles of trees and tropical vines, are inhabited by monkeys, parrots, sloths, tapirs, boa constrictors, and pumas. Along the rivers Indians live in villages and barter with white traders marketing dyewoods, rubber, and Brazil nuts. Para, near the mouth, is the chief port of the Amazon. Numerous steamers make regular trips between Para and up river landings. They bring down forest products, including lumber and dyewoods, and carry up groceries, tools, and clothing. The basin of the Amazon comprises the largest tract of fertile unimproved land in the world. Its only rival in this respect is the valley of the Congo.

Amazons, a legendary nation of female warriors, reputed to live somewhere in Asia Minor. The men were left at home in a domestic capacity. The women cut off the right breast that it might not interfere with the use of the bow, and went to war. Under their queen, Penthesilea, they marched to the relief of Troy. The battles of the Amazons were a favorite subject with the Greek sculptor. It is not considered complimentary to call a woman an Amazon—too masculine. In pacifying their African possession of Dahomey, the French encountered really formidable forces of women warriors. They are spoken of as the Amazons of Dahomey.

Ambassador, a diplomatic officer of highest rank. Of various agents that may be sent abroad by a government to look after its interests, consuls, envoys, and ministers, the ambassador is the highest, and is supposed to be sent by a nation of high standing to another of equal rank. An ambassador is ranked as a personal representative of his sovereign. He is entitled to admission for a personal talk with the monarch of the court to which he is sent. Not to grant such an audience would be an affront to the sovereign of the ambassador. A mere minister is entitled to an audience from the secretary of state or prime minister. It is considered wise to clothe an ambassador with more authority than a minister or envoy. Like other diplomatic agents, the ambassador, his family, and entire retinue are granted special privileges in the capital of the country in which they reside. They are exempt from arrest. It is a question in international law whether a member of the ambassador's official family may be arrested, even for murder. An offense is reported to the home government for proper correction. By an act of 1893 Congress authorized the president to appoint an ambassador to Great Britain, Austria-Hungary, France, Germany, Italy, Mexico, and Russia. Japan, Turkey, Brazil, Spain and Argentina have been added. Governments receiving ambassadors from the United States also send ambassadors to Washington. Our ambassadors receive salaries of $17,500, but house rent and other expenses necessary to keep up appearances at a wealthy capital far outrun the salary. The German Empire maintains ambassadors at Rome, Madrid, Washington, London, Paris, St. Petersburg, Vienna, and Constantinople, with salaries ranging from $25,000 to $37,000 each. See DIPLOMATIC SERVICE.

Amber, a fossil resin. It is found in greatest abundance on the shores of the Baltic, where mines are worked to a depth of one hundred feet. Lumps of amber are found in a stratum of material, half wood and half coal. After storms the shores are searched for pieces which may have been cast up by the waves. Small specimens have been found in the sands of New Jersey and in the soft coal beds of western America. Amber is of a pale yellow color, usually nearly transparent. It is considered to be the resinous gum exuded by certain extinct pine trees. Several hundred different kinds of insects have been found inclosed in amber, as well as leaves and fragments of many plants. Amber is highly prized, particularly for the mouthpieces of pipes. Eastern Europe, Turkey, and Persia pay high prices for genuine amber. A fine specimen is worth its weight in coin. The Cabinet of Berlin has a mass of eighteen pounds, valued at $30,000. Recent explorers of the lakes of Switzerland have discovered pieces of amber in the ruins of the old lake dwellings, showing that commerce in amber is of ancient date. The Romans admired amber ornaments. They thought amber

beads a charm against poison and the baleful influence of sorcery and witchcraft. Frictional electricity was first noted in connection with amber. See KAURI.

Ambergris, am'ber-grēs, an ash colored, inflammable sort of wax. The name signifies gray amber. It is found in lumps of from an ounce to 200 pounds in weight, floating on the sea, especially in the vicinity of the Bahama Islands or other localities frequented by sperm whales. It is also obtained from the intestines of the sperm whale. See WHALE.

Ambrose, Saint (about 340-397), an early Father of the Church, and a writer of Latin hymns. He was gentle and wise and won the favor of both Arians and Catholics. He was elected Bishop of Milan in 374. The famous Ambrosian Library at Milan was named in his honor. He died in Milan in 397.

Ambrosia, ăm-brō'zhā or zhĭ-ā, in classical mythology, the food of the gods, capable of imparting immortality to any who partook of it. It is also represented as a richly perfumed unguent. Hence, in literature, the word is used to express the idea of divine beauty or excellence. See NECTAR.

His dewy locks distill'd ambrosia.—Milton.

Ambulance, a vehicle for the conveyance of the sick and wounded. During the wars of the French revolutionary period the term was applied to a field hospital on wheels. It was fitted up with cots, linen, and surgical tables, and was in charge of a surgeon. In the American Civil War the name was applied rather to large wagons used to gather up the wounded and to convey them to field hospitals. In many cities the ambulance service is admirably organized. If a fireman or other person is injured, a telephone call brings an automobile ambulance in an incredibly short time. The Red Cross Society maintains an ambulance service. Like the fire engine the ambulance has the right of way over ordinary vehicles. Rubber tires are of service in lessening the jolting which must be inflicted on patients while being conveyed to the hospital.

Amendment. See CONSTITUTION.

America, the western continent including North and South America and adjacent islands. The name was applied originally to the eastern part of Brazil by reason of a book of travels written by the Florentine navigator, Amerigo Vespucci. In 1541 Mercator's map extended the name to the entire western world. By a peculiar shift again, the term is now applied, in a narrow and incorrect sense, to the United States by way of distinction from Canada, Mexico, and the countries of South America.

GEOLOGY. Roughly speaking, America consists of two triangular land masses joined by a third known as Central America. There is a theory, probably fanciful, that in a remote geologic age the western continent was torn away from the eastern by a convulsion of nature and that the Atlantic Ocean now fills the chasm between. Whether well advised or not, the theory is useful to call attention to the nearly uniform width of the Atlantic when measured on east and west lines; and to the fact that, were the continents brought together, Africa would fit into the Caribbean region, Brazil would fill the Gulf of Guinea, and Labrador would approach the British Isles. The islands now in the way of such a joining are of recent, chiefly volcanic, origin. Though called the New World, America is geologically an old continent. The North American highlands, including Labrador, the Adirondacks, and the Great Lake region, northward to Hudson Bay, are older than any portion of Europe. The rocks about the head of Lake Superior are among the oldest in the world. The eastern highlands of South America are also of great antiquity

TOPOGRAPHY. In many respects the physical features of North and South America are alike. The northeastern highlands have been mentioned. The major mountain chain of each American grand division runs north and south along the western border; the Andes very near the ocean, the Rockies far enough from the coast to permit room for lower ranges and large areas of valuable territory. The Appalachians and the mountains of Brazil complete the comparison. As to rivers and their plains, the La Plata corresponds to

the Mississippi; the Amazon to the St. Lawrence; the Orinoco to the Red River of the North and the Saskatchewan, and the Magdalena to the Mackenzie; but here the parallel stops. South America has no land mass corresponding to Alaska, no river answering to the mighty Yukon. The North American triangle is the larger. If we add the West Indies and Central America, its area is approximately 8,700,000 square miles, while that of South America is reckoned at 7,300,000, a total area of 16,000,000 square miles for the continent, exclusive of Greenland. It is somewhat less than a third of all land areas of the world combined. The student cannot fail to note that the broken and irregular coasts of northern and of eastern North America resemble in this respect the northern and western coasts of Europe; and that South America and Africa resemble each other in regularity of outline. The greater part of South America lies in the torrid zone. The greater part of North America lies in a temperate zone, greatly to the advantage of the North American countries.

Flora and Fauna. In its plants and animals North America is closely related to Northern Asia and Europe; South America has a peculiar fauna and flora of its own. In respect to plants and animals Central America and the West Indies resemble South America. The North American animals of the deer, cat, and dog families are quite like those of north Asia and Europe. In the case of rats, mice, squirrels, marmots, and a long list of fur-bearing animals, as the beaver, marten, and otters, the similarity is close, and many native animals are apparently identical. The same remark applies to fishes, as pike, trout, salmon; to birds and insects without number, and even to serpents. The opossum may be mentioned as a strictly North American animal.

In South America, on the contrary, including Central America and the West Indies, as stated, the animals are quite distinct from their Old World relatives. There are a few native animals also found elsewhere. The numerous monkeys and parrots of the South American forests are peculiar to the region. The sloth, armadillo, ant-eater, tapir, llama, capybara, guinea pig, boa, and anaconda are as peculiar to South America as the zebra and the hippopotamus are to Africa. Many hummingbirds, flycatchers, pigeons, goatsuckers, wading birds, the rhea, and others, in fact the greater part of 3,000 species, are known only to the South American region. It is the egg collector's paradise. In fishes, too, Agassiz found the waters rich. Sturgeon and perches are entirely wanting, but he found over a thousand new species in the waters of the Amazon alone.

Between the border of the Arctic Ocean and Patagonia there is room for a variety of plant regions that we cannot take space to describe in full. The sharpest contrasts are found within the tropics where differences in moisture and elevation produce corresponding differences in vegetation. Within a few degrees of the equator are found the lofty forests of the Amazon, in which ordinary trees are but underbrush; the grassy plains of the llanos of the Orinoco; the upland fertile valleys of the Andes; the region of eternal ice and snow; volcanoes under the equator itself, and barren deserts on the Pacific coast. No greater contrast is possible and many interesting parallels may be drawn. The frozen tundras of the Arctic coast, with moss, shrub, and saxifrage, correspond in a way to the barren rocks of Patagonia; the Great Plains to the cattle region of Argentina; the cereal region of the Mississippi Valley to that of the La Plata; Mexico to the uplands of Bolivia and Peru; while the West Indies have points in common with the coffee country of Brazil and with the banana region of Central America.

See articles on the various countries, rivers, cities, minerals, animals, plants, etc.

American Association for the Advancement of Science, The, an organization for the promotion of scientific work and research and to gain an influence over scientific movements. It was organized as the Association of American Geologists, but adopted the present name in 1847. The Association is divided into the following sections: Mathematics and

astronomy, physics, chemistry, mechanical science and engineering, geology and geography, zoology, botany, anthropology, economic science and statistics. The associtaion holds annual meetings and publishes an annual volume of proceedings, which is one of the most valuable contributions to scientific literature in America. There are about 3,500 members, consisting of the most prominent leaders of science in America, leading educators and others in sympathy with the work.

American Civic Association, an organization formed in 1904 for the "cultivation of higher ideals of civic life and beauty in America; the promotion of city, town and neighborhood improvement; the preservation and development of landscape, and the advancement of indoor art." The association works along national lines. City planning, rural improvement, the selection and development of parks and boulevards, judicious tree planting, the elimination of smoke, billboards, the house-fly nuisance, and the organization of adults and children into working bodies for civic improvement are among the leading activities.

American Farm Bureau Federation, a national federation of state farm bureaus and similar agricultural societies. The purpose of the organization as stated in the constitution are: "To correlate and strengthen the state farm bureaus and similar state organizations; to promote, protect and represent the business, economic and educational interests of the farmers of the nation and to develop agriculture."

The governing body consists of a board of directors representing the state federations. This board holds annual and special meetings. The administrative affairs are in the hands of an executive committee of twelve members, representing the different sections of the United States and having power to elect a salaried secretary. The Federation was organized in Chicago, in November. 1919.

American Legion. A non-political organization with membership open to all persons who were in the military, naval or marine service of the United States between April 6, 1917 and November 11, 1918. The object of the association is to uphold and defend the Constitution of the United States; maintain law and order; foster and perpetuate a 100 per cent Americanism; combat autocracy whether of classes or masses; to make right the master of might; to promote peace and good will on earth; to safeguard and transmit to posterity principles of justice, freedom and democracy; to sanctify the comradeship of war by mutual helpfulness. It was organized in May, 1919, at St. Louis with temporary officers only and it was there decided to hold the first annual convention in Minneapolis in November. Here the organization was perfected and national officers chosen. Meanwhile it had been incorporated by special act of Congress September 18, 1919. The first National Commander was Franklin D'Ollier of Philadelphia. Headquarters of the American Legion was established at Indianapolis, Indiana. The organization soon attained a membership of a million. The second annual convention was held in Cleveland in late September, 1920. The convention went on record in favor of continuing its policy of strict neutrality on all political questions. Col. J. W. Galbraith, Jr., of Cincinnati, was elected National Commander.

Women's Auxiliary. The Women's Auxiliary was established at the convention in Minneapolis in 1919. Membership in the Auxiliary is limited to the mothers, wives, daughters and sisters of members of the American Legion, and to the mothers, wives, daughters and sisters of all men and women who were in the military and naval service of the United States between April 6, 1917, and November 11, 1920. The Auxiliary is governed by the same constitution as the League and has practically the same lines of work

American Museum of Natural History, The. It is located in Central Park, New York City. It was founded in 1869. It is one of the greatest and most important natural history museums in the world. It ranks with the National or Smithsonian Museum, at Washington, D. C., and is excelled only by the British Museum in London. It was begun by private citizens,

but is now a public institution, and free to all. The material exhibited is rich and varied, and is arranged with a view to the greatest educational value. There are large collections of shells; skeletons of now extinct or rare animals; a great variety of living mammals; birds, alive and dead; models of cliff dwellings in Colorado; pottery of the mound-builders; stone implements used by people in the so-called Stone Age, and a large collection of rocks and precious stones. See METEORITE.

American Ornithologists' Union, a society of students of birds. The society was founded in 1883. Its membership is limited to twenty-five honorary members, among whom are the most eminent ornithologists of foreign countries; fifty active members residents of North America; one hundred corresponding members, and associate members, resident in North America. Any person interested in birds may become an associate member. An annual meeting is held in one of the Atlantic cities. *The Auk,* Cambridge, Massachusetts, a quarterly magazine, is the official organ of the A. O. U., as the union is called. See AUDUBON SOCIETY.

American Party, or **Know-Nothing Party,** in American politics, an organization opposed to foreign-born voters and to Roman Catholic influence in national affairs. During the late forties of the nineteenth century there was a tremendous emigration from Ireland into this country. Irish laborers poured into the Atlantic cities. Our naturalization laws permitted them to become voters on short notice. They controlled the cities, and were a large factor in state politics. The agitation against the Irish centered in New York and Philadelphia. Both parties were guilty of mob violence and rioting. The native Americans went so far as to burn Irish Catholic churches. The Irish voters paraded the streets with banners bearing such mottoes as "Americans shan't rule us." Anti-foreign sentiment, chiefly against the French, led the Federalists in 1798 to increase the term for naturalization from five to fourteen years. The same sentiment was responsible for the passage of the Alien and Sedition Laws. Although the Republicans repealed the Federal naturalization law in 1802, agitation continued. In 1835 a vigorous anti-foreign political movement was started in New York City. In 1844 the American party cast six electoral votes for Clay. In 1852 increased Irish emigration following the potato famine of 1846 started up the Americans anew. The nucleus of the party was a secret, oath bound society. From a constant habit of answering all inquiries with the profession of not knowing, they were called the Know-Nothings. In 1854 the Know-Nothing party carried state elections in Massachusetts and Delaware. In 1855 they carried most of the New England states, New York, Maryland, Kentucky, and California. In 1856 the Know-Nothing national ticket received 874,000 out of a total of 4,000,000 votes, and actually elected six members of the electoral college. From this time on the party declined. The results of the Civil War, during which foreign-born citizens rendered signal service to the Union cause, gave the Know-Nothing party its quietus.

Americanism, in the history of the English language and literature, a word, phrase, or idiom peculiar to the United States. Some expressions known by the term have originated in America. Hominy, wigwam, squaw, moose, pemmican, and teepee are words of this sort. They are chiefly of Indian origin. Some expressions that are colloquial in England have been raised to the rank of national usage in this country. Other words and expressions known only in some parts of Great Britain, belonging to the dialect of a district, have been imported to this country and have come into general use. Many English words have acquired new meanings on our soil, and still other words, once reputable, have become obsolete in England, but are still retained by Americans. Similar expressions and idioms are to be heard in Canada, Australia, India, and South Africa, in short, in all regions where a considerable number of English speaking people have colonized. The following list may be regarded as representative, but by no means exhaustive:

Baggage, trunks, handbags, and other personal belongings. The corresponding English expression is luggage.

Bee, a gathering of neighbors or young people to do a piece of work; as a husking bee, to husk corn; a quilting bee to make a quilt.

Bee-line, a straight line across country. We may say of a woodsman, for example, that he takes a bee-line for home.

Blaze, to strike a bit of bark from a tree with an ax. Surveyors blaze a line through the woods.

Blizzard, a violent snowstorm.

Boss, a political manager. Boss Tweed of New York City may be mentioned as an eminent example of the American political boss.

Buggy, a light, four-wheeled driving vehicle.

Calculate, to suppose.

Canebrake, a thicket of cane.

Canyon, a deep water-worn gorge.

Caucus, a meeting to nominate candidates for office.

Clearing, a field opened in the heart of a wood. The term is applied also to the operation of removing trees and stumps.

Corn, maize or Indian corn. The British restrict the term to small grains.

Creek, a small stream. The English call a short, narrow arm of the sea a creek.

Crevasse, a break in the embankment of a river; a leak in a dike.

Deadhead, one who rides or enters free when others pay.

Deed, to convey title.

Depot, a railway station. This use of the word is clearly wrong. A depot is, by rights, a place for the storage of provisions or goods.

Drummer, a traveling salesman; one who drums up trade.

Fall, the autumn season.

Gerrymander, to redistrict a state in order to advance the interests of a party or candidate.

Grit, courage, determination. Sand is used with much the same meaning.

Grocery, a place where groceries are sold. In great Britain a grocery is an article offered for sale. It is never the place of business.

Guess, to suppose; as, "I guess so," for "I think so."

Gulch, a ravine.

Jew, to haggle over prices.

Johnnycake, bread made from cornmeal. Hoecake is a similar word.

Levee, a river embankment, a dike.

Lick, a salt spring frequented by animals. There are famous licks in Kentucky.

Likely, promising; as, a likely candidate. A likely lad is a lad of promise. The term, "likely negro," was used not infrequently in advertising slaves.

Logrolling, in legislative circles, a system of exchanging help. Condensely stated, it means, "You vote for my measure and I'll vote for yours."

Lot, a small tract of ground, as a city lot, a wood lot.

Moccasin, a soft Indian shoe made originally of buckskin.

One-horse, half able to do business; as, a one-horse concern.

Platform, a statement of political principles. The various measures proclaimed in a political platform are called "planks."

Prairie, a grassy plain.

Ranch, a western farm.

Ride, to travel in a vehicle. The British ride on a horse or other animal; they travel or journey in a conveyance.

Saloon, a place where intoxicating drinks are sold. A European saloon is a place of reception; as, the saloon (or salon) of Madame de Staël.

Shanty, a pioneer hut. A similar term is the dugout.

Shop, a workshop. A British shop is a place where articles are offered for sale. A shopworn article, for instance, is an article offered for sale until it has deteriorated.

Spry, agile, active. Emerson's squirrel, we may remember, reminds the mountain:

> You are not so small as I,
> And not half so spry.

Squelch, to repress, to put down; as, to squelch an incipient riot.

Stampede, a sudden flight, to put to flight. Thus we may speak of stampeding a drove of cattle, or we may say that the

crowd stampeded when the police appeared.

Store, a place of sale. The word originally meant warehouse.

Stump, to go about making political speeches. Douglas and Lincoln, for instance, stumped Illinois together.

Succotash, green corn and beans boiled together.

Telescope, a kind of hand bag. The name has evidently arisen from the fact that one part of the telescope slides into the other, like a box into a deep cover.

Tenderfoot, a newcomer; one unfamiliar with the ways of the country. In the West, especially, anyone newly arrived from the East is called a tenderfoot. A country lad in the city is more likely to be called a greenhorn.

Ugly, ill natured.

Vest, a masculine garment known in England as a waistcoat.

Whittle, to cut wood with a knife. According to British usage, whittle is a knife-like implement.

Amerigo Vespucci, vĕs-pōōt′che, or **Americus Vespucius** (1451-1512), an Italian navigator. He was a native of Florence and was educated by an uncle who was a friend of Savonarola. Amerigo showed a decided preference for geography and astronomy. He was placed as clerk in a commercial house of the Medici. Later he entered the service of a merchant at Seville, where he contracted to fit out vessels for foreign trade. On the death of this merchant Amerigo filled out an important contract for the king of Spain. Doubtless he was acquainted with Columbus, in fact there is some evidence that he accompanied the great discoverer on one of his voyages. It is certain that Vespucci, now nearly fifty years old, made several voyages to the New World, reached the northern coast of South America more than once, and probably in one voyage touched North America. The fact that the New World was named for the explorer was doubtless due to accident, the suggestion having been made first in an inaccurate account of his voyages published in 1507, and stating that he reached the mainland before either Columbus or Cabot. Vespucci wrote diaries and letters concerning his explorations, but did not claim to have been the first to reach the mainland.

Amethyst, a variety of quartz, stained a violet blue or purple by a trace of iron or manganese. It is a very handsome stone, much used for charms, seals, and rings, but is too common to be considered precious. It occurs in crystals in the interior of agate geodes, nodules, and other rock cavities. The finest specimens are obtained in India, Ceylon, Brazil, and Siberia. Very handsome amethysts are obtained along the shores of Lake Superior. The amethystine sapphire, a gem of great beauty and brilliancy, is often called the oriental amethyst. It is a variety of corundum, and much more valuable than the amethyst proper.

Amherst College, an influential institution at Amherst, Mass. It was opened as an academy December, 1814. Among the distinguished educators connected with its development, Edward Hitchcock, the geologist, and President J. H. Seelye may be named. The number of students enrolled for the year 1922-23 was 520, and the faculty numbered 48 instructors. The productive funds (1921-1922) were $4,810,576; income for the same period $476,087. The library contained 300,000 volumes. On June 18-22, (1921), Amherst celebrated its centennial. Lord Jeffery Amherst, a descendant of Lord Amherst, from whose name that of the college was taken, was a guest of the occasion. The celebration included historical exercises and addresses by well-known Amherst alumni and others. The Institute of Politics held in 1921 was an important event.

Amiens, ä′mĭ-ăn′, an ancient French city on the Somme, seventy-one miles north of Paris. The river here divides into eleven canals, gaining for the city the name of Little Venice. The old walls, save the citadel, have been leveled to form wide boulevards. A museum, a library of note, a fine city hall, and numerous learned societies give Amiens an atmosphere of culture; but its pride is the Cathedral of Notre Dame, sometimes called the "Parthenon of Gothic Architecture." It was

built 1220-1288, and is considered one of the finest cathedrals in Europe. The vaulted ceiling of the nave is 141 feet above the pavement of the floor. Many a siege was withstood by the old city, and many a battle was fought under its walls. The famous treaty of Amiens was concluded here in 1802, between Great Britain, France, Spain, and Holland. Peter the Hermit, who lived in the eleventh century, was a native of Amiens. The Prussians occupied the city in 1870. The modern city has a population of 92,000. It is an important manufacturing and distributing center. Cotton, velvets, woolen and linen cloth, flax, beet-root sugar, leather, paper, and soap are among the local products.

Ammon, an Egyptian deity whose worship extended through many parts of North Africa and Greece, but centered at the Egyptian city of Thebes. Ammon was represented in Egyptian art usually as a person with the head and horns of a ram. He was the protector of cattle and shepherds. The reader may recall that Alexander the Great toiled through the Libyan Desert to the famous oracle of Jupiter Ammon in an oasis. He is said to have been gratified by a declaration of the priests to the effect that he was a son of Jupiter.

Ammonia, a colorless, pungent gas composed of one atom of nitrogen to three of hydrogen. It is a light gas, about half as heavy as ordinary air. It flies up one's nose with an acrid, intense effect, bringing tears into the eyes. Ammonia is absorbed readily by water, in which form, of greater or less strength, it is usually sold, and is a familiar household article. The name is thought to have been derived from the temple of Ammon in Egypt, in the neighborhood of which, it is stated, ammonia was prepared first from the dung of camels. Ammonia was prepared formerly in commercial quantities by heating the antlers of deer in a retort, whence the spirits of hartshorn, used as the basis of smelling salts for headache. It is now obtained chiefly as a by-product in the preparation of illuminating gas from coal. About five pounds of ammonia are obtained from one ton of coal. At a temperature of —29° Fahrenheit ammonia liquefies. As it absorbs an immense amount of heat in vaporizing, it is much used in making artificial ice and in creating the degree of cold required for cold-storage. Large quantities of ammonia are required in dyeing establishments and in cotton factories. It is indispensable in the printing of calico. See Ice; Cold Storage.

Ammonite, a fossil shell belonging to an extensive genus of extinct mollusks. They were allied to the chambered nautilus. The shells were lined with pearl and furnished with partitions. The fossils vary in size from a pin head to shells four feet in diameter. All are curled up like flat snail shells. Ammonites have a fancied resemblance to a ram's horn, or the horn of Jupiter Ammon, whence the name. In Scott's *Marmion,* Whitby's nuns tell their hosts of Lindisfarne:

> How, of thousand snakes, each one
> Was changed into a coil of stone
> When holy Hilda prayed;
> Themselves, within their holy bound
> Their stony folds had often found.

Ammunition, a term originally applied to all military stores or supplies for attack or defense; but confined in modern American usage to the materials which are used in the discharge of firearms and artillery of all kinds, as powder, shot, various kinds of shells, bombs, etc. Ammunition of which the materials are combined in cartridges or otherwise to facilitate the loading of firearms or ordnance is called "fixed" ammunition; and the term metallic ammunition is applied to fixed ammunition for small arms, including rifles and shot-guns, and for machine-guns and rapid firing guns of small caliber, inclosed in brass or copper cartridge cases. A round of ammunition is a single charge or load of fixed ammunition.

All ammunition consists essentially of three parts, namely, the exploding charge, usually gunpowder, the projectile, and a primer, and in fixed ammunition these are all combined in a single piece or shell, of varying sizes. For heavy guns, the explosive charge is loaded separately from the projectile, and the primer may also be separate. Fixed ammunition is generally

used for army and navy guns of calibers not exceeding four inches, while guns of larger caliber usually have the powder charges put up in powder bags, for separate loading into the guns.

Fixed ammunition is usually put up in metallic cartridge cases, made of hard-drawn brass, with a rim or groove around the base, to enable the extractor to take hold of the empty case and withdraw it after firing. The rim also assists in holding the shell in its proper position in the chamber of the gun. Cardboard or papier-mache shell cases are commonly used for breechloading shotguns, but the shell base is formed of brass.

Powder charges are ignited in all fire-arms and ordnance by means of primers, of which there are four types; namely, percussion, friction, electric, and a combination of percussion and electric primers. Percussion primers are used in small arms and light artillery. They ignite the charge by means of a percussion cap in the head, when this is struck by the firing pin of the gun lock. The common small arm primer is fulminate of mercury. Friction primers operate by the friction of a strip of metal drawn through the fulminate in the primer head. This type of primer is most frequently used to detonate the explosive charge of shells and grenades. Electric primers are ignited by an electric spark, and guns thus equipped may be fired from a considerable distance, if necessary. The combination primer, which is largely used in heavy guns of modern type, is arranged to be fired by either electricity or percussion.

The artillery projectiles of modern warfare are of a great variety of sizes and usually have bursting charges. Naval projectiles are designed for penetrating armor-plates and are the heaviest of all; and when the charge required to project them exceeds 100 pounds, the gunpowder is loaded into the gun in sections, put up in bags of serge or silk.

From the first use of cannon in ships in the sixteenth century, there was little development in the science or industry of explosives until the nineteenth century, but it reached the proportions of a tremendous industry in the World War period, 1914-1918, in Europe and America. Many industrial establishments in the United States were converted into ammunition factories during the war, and they had an immense output. The use of high explosives for the bursting charges of artillery shells was developed, and the term "TNT," for trinitrotoluol, became familiar. This is only one of many modern explosives used as bursting charges, such as cheddite, cordite, etc. Like smokeless powder and nitroglycerine, it is made by treating organic materials with a mixture of nitric and sulphuric acids. When the war closed, all surplus TNT and other explosives owned by the War Department, which could be used in clearing land, building roads, and general construction work, were turned over to the Department of the Interior; and this material, which at one time was considered practically worthless, had an estimated value of $15,000,000 for peaceful purposes.

Ammunition for machine guns is usually assembled in strips or belts of cartridges, which are fed automatically into the gun. Army experts, in 1922, developed a new type of bullet for use in rifles and machine guns. This is called a boat-tail bullet, because of a six-degree taper at its tail, and exhaustive tests are said to have shown that the change in shape had added greatly to the maximum range attained, while flattening the trajectory, or arc of flight, approximately 30 per cent at a range of 1,000 yards, thus rendering the fire more dangerous to an enemy in its path, by decreasing the "zone of safety."

In early days a gun was loaded with a charge of powder followed by a wad of tow or paper; then a spherical bullet or a charge of shot, and in the latter case a second wad to keep the shot in place. The first wad enabled the powder to force the load out. Percussion caps ignited by a blow of a hammer were invented about 1830. The metallic cartridge in which the powder and lead are contained, as well as a percussion priming by which the powder is fired, is credited to French invention in 1831. Elongated or Minie bullets were used in the Crimean War. A much longer

steel bullet is used in a modern Winchester. Bullets that flatten or explode in the body are forbidden by the ethics of modern warfare. They are called "dum-dum" bullets.

Amnesty, an act declaring that certain offenses, usually political, have been overlooked. A pardon is the forgiving of an individual person for a crime committed. The offense is still an offense, and the person is still guilty, but is forgiven. In case of amnesty, proclamation is made that the offense is obliterated, and those concerned will not be punished. It is considered public policy to issue an amnesty proclamation at the close of a civil war or an insurrection. Sometimes individuals are excepted from the benefit of the proclamation. When the Stuart family was restored to England in 1660, Charles II issued a proclamation of amnesty excepting, however, thirteen persons by name, who were closely concerned in the execution of his royal father, Charles I. Two of these regicides, Goffe and Whalley, escaped to New England and lived for many years in partial concealment among their friends. At one stage of the American Revolution the British government offered a general amnesty to all Americans who should lay down their arms, John Hancock and Samuel Adams being excepted by name. The Continental Congress made a serious mistake in not issuing a proclamation of general amnesty at the close of the American Revolution. A large number of American royalists, people of intelligence and wealth, were compelled to leave for Canada and England to the corresponding loss of our own country. A general amnesty was proclaimed at the close of Shays' Rebellion, 1787; and another from which a few, notably Jefferson Davis, were for a time excepted, was proclaimed at the close of the American Civil War in 1865.

Amoeba, a-mē′bä, plural amoebae, a low form of animal life found occasionally in fresh water. A dipper-full of water from the edge or bottom of a grassy, stagnant pool may contain hundreds of amoebae. An amoeba is so small that it cannot be seen with the naked eye. Examination of a drop of the water under a miscroscope is necessary for its identification. It is then found to be a particle of white jelly, having a somewhat granular central portion and an outer transparent part. When first seen, the amoeba may appear to be entirely motionless; but careful observation shows it to be constantly in motion, although it has neither head, tail, nor feet; nor eyes, ears, or nose. It moves about from place to place by thrusting any part of its body out into narrow but blunt projections, and then drawing in the projections which it does not need for advance.

When the amoeba is examined with a high power microscope, objects which otherwise would escape notice are seen within its substance. One of these is a small, rounded body, darker in color than the surrounding substance, and preserving its form at all times. This object is called the *nucleus*. The nucleus is made of protoplasm, just as is the entire body of the amoeba; but it is surrounded by a membrane and refracts light more strongly than the body of the amoeba. The other object seen is a clear, rounded space, apparently filled with a watery fluid. This is called a *vacuole*. It increases and then decreases in size many times during an hour, and is thought to expel a liquid which it receives from the surrounding protoplasm.

The amoeba is a type of the *one-celled* animals, for a particle of living protoplasm containing a nucleus is called a *cell*. It has no organs of any kind, except the nucleus and vacuole. Although so simple in its structure the amoeba grows, takes nourishment, digests and assimilates food, excretes waste matter, and produces other creatures like itself, as do the higher animals. Its food consists of very small one-celled plants, or of particles of higher plants or animals. It engulfs or envelopes a food-particle in the substance of its body, where it becomes surrounded by a watery globule and finally disappears. The indigestible part, if there is any, passes out of the body. That portion of the food which is retained is doubtless mixed with the substance of the body and adds to its size.

When an amoeba becomes full-grown, the nucleus divides into two nuclei. The protoplasmic body of the amoeba also divides in such a way that each part contains

one of the nuclei, and in this way two amoebae are formed. When these two become full-grown, the same operation is repeated, so far as known indefinitely, so that the amoeba is sometimes said to be "immortal."

There are many species of amoebae, some harmless, others producing diseases (malaria, dysentery, etc.), if introduced into the body by drinking water or otherwise.

See BACTERIUM.

Ampere, ăm′pār, **Andre Marie** (1775-1836), a French scientist. A native of Lyons. His father fell under the guillotine in 1793. Young Ampere was well educated and became a professor of physics in the University of Paris. A member of the French Institute, 1814. Several treatises by Ampere give him high place in the development of the science of electricity. His most renowned work is a *Collection of Observations on Electro Dynamics,* 1822. Ampere's discoveries in the field of science were remembered by giving his name to the unit of electrical current. An ampere is the current corresponding to an electromotive force of one volt moving through an ohm of resistance. It is about the current of a Daniell cell through thirty-nine feet of No. 24 copper wire.

Amphiaraus. See SEVEN AGAINST THEBES.

Amphibians, in popular language, animals living both on land and in the water. This usage of the word covers animals that breathe atmospheric air, but disport themselves in water with ease and enjoyment. When in the water they require to come to the surface to breathe. The term includes the hippopotamus, the water rat, the beaver, the otter, the mink, the seal, the walrus, the alligator, the crocodile, the turtle, the frog, the newt, the water snake, the duckbill—it is hard to say where the list leaves off. As used by zoölogists, amphibians are the frogs, toads, newts, salamanders, sirens, axolotle, etc. The young of these animals are provided with gills, tadpole fashion, and breathe in the water. The adults breathe atmospheric air. Though at home in water or on land, they drown if forced to remain submerged. The lowest amphibians are footless, worm-like, creatures, chiefly tropical, which scientists have not had opportunity to study with care. See articles on the various animals named.

Amphictyonic (ăm-fĭc′tĭ-ŏn′ic) **Council,** the court of a league of twelve Grecian states to protect the temple of Apollo at Delphi. The purpose was religious, not political. The delegates of the league, two for each city, met in solemn conclave to determine matters of worship and incidentally to adjust quarrels between cities. We learn from Aeschines that the delegates had equal voice, and that the members of the league bound themselves by oath that "they would destroy no city of the Amphictyons, nor cut off their streams in war or peace; and if any should do so, they would march against him and destroy his cities; and should any pillage the property of the god, or be privy to, or plan against, what was in his temple at Delphi, they would take vengeance on him." The deputies met twice a year, alternately at Delphi and at Thermopylae. Membership in the league was a high honor. One of Philip's first steps toward supremacy in Greece was to force the admission of Macedon to a seat in the Amphictyonic Council. After that it no longer commanded respect, becoming extinct in the second century. The word means "of those dwelling about." Greece had many "amphictyonics," of which the Delphic was only the most famous. See AREOPAGUS; PHILIP II of MACEDON.

> An Amphictyonic body was ar assembly of the tribes who dwelt around any famous temple, gathered together to manage the affairs of that temple. . . . It is easy to understand how the religious functions of such a body might incidentally assume a political character. . . . Once or twice then in the course of Grecian history, we do find the Amphictyonic body acting with real dignity in the name of united Greece. . . . The Amphictyonic Council was not exactly a diplomatic congress, but it was much more like a diplomatic congress than it was like the governing assembly of any commonwealth, kingdom or federation.—E. A. Freeman.

Amphion, ăm-fī′ŭn, in Greek mythology, a son of Zeus, and husband of Niobe. He was a famous musician. It was said that when he built the wall of Thebes, the stones moved voluntarily into place to

the music of his lyre. So Apollo was said to have built Troy to music. Tennyson borrowed this idea in *Idylls of the King,* where he represents the "shadowy Camelot" as having been built to music. Tennyson has also written a poem entitled *Amphion,* in which he treats the story of his musical power humorously:

O had I lived when song was great
In days of old Amphion
And ta'en my fiddle to the gate,
Nor cared for seed or scion!
And had I lived when song was great,
And legs of trees were limber,
And ta'en my fiddle to the gate,
And fiddled in the timber!

'Tis said he had a tuneful tongue,
Such happy intonation,
Wherever he sat down and sung
He left a small plantation;
Wherever in a lonely grove
He set up his forlorn pipes,
The gouty oak began to move,
And flounder into hornpipes.

Amphitheater, a spacious elliptical building used by the Romans for games and wild beast shows. The term is composed of *amphi,* meaning both, and *theater.* The seats of the Greek theaters occupied one side only of an ellipse, while the stage held the center. In the Roman amphitheater, both sides of the ellipse, that is to say, the entire border, were seated. See COLISEUM.

Amphitrite, ăm-fĭ-trī′te, in Greek mythology, a daughter of Oceanus and Tethys, or possibly of Nereus and Doris. Poseidon wished to make Amphitrite his wife. She hid from him, and he sent a dolphin to find her. The dolphin was successful, and as a reward received a place among the stars, where he may still be seen in the constellation Delphinus. In other accounts Poseidon is represented as seeking Amphitrite himself, but riding on the dolphin. Poseidon and Amphitrite succeeded Oceanus and Tethys as rulers of the waters. In art Amphitrite is represented as drawn by tritons in a chariot of shells, or as riding on a dolphin, bearing the trident of Poseidon in her hand. See POSEIDON; TRITONS.

O'er the green waves which gently bend and swell,
Fair Amphitrite steers her silver shell;
Her playful dolphins stretch the silken rein,
Hear her sweet voice, and glide along the main.
—Darwin.

Amphora, ăm′fo-rȧ, a large, two-handled jug-like vessel of hard-baked, unglazed clay, much used by the ancients. The name is Greek, meaning to carry with both, referring to the use of two hands, one on each handle. The amphora was a slender affair half as tall as a person. It had a narrow neck and ended in a sharp point below, that might be placed in a hole in a table or thrust into the ground to hold the jug upright. It was used to store grain, pulse, wine, honey, and olive oil, and often as an urn in which to keep the ashes of cremated relatives. As a measure of capacity, the Greek amphora contained about nine English gallons; the Roman, six. Ornamental amphorae provided with bases were made of precious metals, bronze, alabaster, and marble. Such vases were highly decorated and were given often as prizes in athletic games. See POTTERY.

Amsterdam, dam of the Amstel, the chief city of the Netherlands. It is situated on the Amstel River, at the center of a network of canals. The largest of these give passage from the North Sea to steamers of over twenty-feet draught, making Amsterdam an ocean port. The city has the shape of a semicircle, with the diameter following the river. The blocks of the city are of an irregular shape. Canals follow the middle of the streets, dividing the city, as it were, into ninety-four islands. Walks lined with trees follow the canals on either side, and are carried across the river and canals by high bridges of stone, iron, or wood, beneath which boats may glide. Many of the houses and places of business stand with high gable ends toward the streets.

The entire city is built over an old peat bed. The foundations of the buildings are supported on piles. The old statehouse, now a royal palace, stands, it is said, on 13,659 piles, driven deep into the peaty soil. It covers a large city block. Within is a magnificent banqueting hall, 120 feet long, 57 feet wide, and about 90 feet high. It is said to be the largest and most

imposing in Europe. The wainscoting is of beautiful Italian marble. Various learned societies, a public university, museum, art gallery, the latter containing Rembrandt's masterpiece, the *Night Watch,* a botanical and a zoölogical garden, statues, several theaters, and musical societies give Amsterdam a claim to high rank as a city of learning, leisure, and culture. A modern suburb across the river is a residence section.

Commercially the city is no less prosperous. Seen from a bridge or other point of vantage, the river and principal canals carry a forest of masts. Commerce is free from all tariff duties and is carried on with the Dutch colonies in distant parts of the world as well as with nearby nations. Foods, cloth, dyes, metals, woods, oils, herring, tobacco, furs, dairy products, and bulbs and other nursery stock are handled in enormous quantities. Among prominent local industries, brewing, distilling, sugar refining, sail and rope making, silk weaving, dyeing, preparation of chemicals, cutting and polishing diamonds, making gold and silver plate, printing, and type founding, may be mentioned. Amsterdam is the center of the Dutch Reformed Church.

The country surrounding the city lies chiefly below the sea level. In summer green meadows stretch away in every direction, and are protected from the sea by dikes. Public waterworks have taken the place of rain-water cisterns; palatial hotels and clubs render Amsterdam a pleasant place for tourists. The old city walls have been converted into boulevards. Windmills add to the picturesque appearance of the suburbs. The population in 1921 was 642,162.

The history of Amsterdam is one of commercial ups and downs. In 1200 it was a small fishing village hard by the castle of the lords of Amstel. A century later the count of Holland assumed direct ownership, and granted the town a commercial charter. An irregular semicircle, now occupied by beautiful parks and boulevards, marks the site of a fortifying wall erected in 1482. The union of the seven provinces in 1579, and the formation of the Dutch East India Company in 1602, made Amsterdam the busy mart of a nation that at one time hoped to drive British shipping from the sea. The early name of New York, it may be remembered, was New Amsterdam. The Peace of Westphalia, 1648, closed the rival port of Antwerp and gave Amsterdam a temporary but great advantage. During the Napoleonic wars the ships of Amsterdam lay rotting at the wharves, and wealthy families were reduced to poverty. Amsterdam has been occupied by the army of an enemy more than once. See NETHERLANDS; ANTWERP; HAGUE.

Amsterdam, N. Y., is 33 miles northwest of Albany on the north bank of the Mohawk River. It was settled about 1775 under the name of Veedersburg.The present name was adopted in 1804. It has a public library, modern schools, and St. Mary's Institute is located here. Woven and knit goods are the most important manufactures. Population, in 1920, 33,524.

A'mundsen, Roald (1872-) a distinguished explorer and navigator. Among the many notable achievements of the first decade of the twentieth century, which, because of the number of such events, has not received its just share of attention, was the discovery of the Northwest Passage. That famous route, sought for more than four hundred years by men whose names are honored in the realm of explorations, was traversed for the first time by the intrepid sailor, Amundsen. Born in Borge, Norway, enjoying but a common school education, with but a sailor's usual experiences till 25 years of age, he then joined a south polar expedition. Upon his return he decided to seek the north magnetic pole and if possible make the Northwest Passage, for which he spent a number of years in study and preparation. With what many regarded as a mere cockle-shell of a boat, less than seventy-five feet long, propelled by a petroleum engine, and accompanied by eight more sailors, he set out from Christiania in June, 1903. After two years of exploration and observation, his little boat, the Gjoa, threading its way through the straits where none had gone before, in October, 1905, was frozen in near the

mouth of the Mackenzie River. From here, in the brief space of six weeks, though it was the dead of Arctic winter, he made his way overland 700 miles to a settlement. In the spring he returned and took his boat through Behring Strait to San Francisco, the little Gjoa being the first to pass from Atlantic to Pacific north of North America. On December 14, 1911 with four companions Amundsen raised the Norwegian flag at the South Pole. The expedition left Christiana in June, 1910 in Nansen's ship, the Fram, ostensibly bound for Behring Strait via Cape Horn. From Madeira he cabled that he was going to the Antarctic in an endeavor to reach the South Pole. On February 10, 1911 his land party began establishing advance depots for the polar sledge journey which actually began October 20, reached its goal on December 14, and ended January 25, 1912 with the return to the Bay of Whales, one year from the time of landing.

Captain Amundsen left Norway in the steamer *Maud* in June, 1918, intending to drift across the Arctic Ocean. He met with misfortune, and spent the winter of 1918-19 in the Bering Strait. Refitting his ship at Nome, he was disabled near Cape Serdze, Siberia, in 1920, and was again forced to return to Nome. Amundsen began another Arctic voyage in 1922, and proceeded to Wainwright, but found conditions unfavorable, and decided to wait until May or June, 1923.

Captain Amundsen now bears the honor of being the only navigator who has explored the northern coasts of both Asia and America. He is the author of *The Northwest Passage* and *The South Pole*.

Amur, ä-moor′, a large river of eastern Asia, emptying into the sea of Okhotsk. It ranks with the Volga, having a total length of about 1,500 miles. The territory drained by the Amur contains no less than 600,000 square miles, surpassing in that respect the largest river basin of Europe. It consists of mountain ranges, immense and valuable forests, and extensive, fertile plains. The winters are severe. Fur-bearing animals and fish are abundant. The Russian portion of the valley is thinly populated. See MANCHURIA.

Amy Robsart. See SCOTT; KENILWORTH.

Anabaptists, in church history, the name given a sect which caused considerable disturbance in Germany, the Netherlands, Switzerland, and other places during the period of the Reformation. The word signifies rebaptism, and had reference to the belief that infant baptism is not real or valid baptism. While this belief gave the sect its name, it was in reality the least important part of its system. Its members believed in the absolute equality of all Christians, in obeying the letter of biblical command, in personal revelation. Denying the right of civil and ecclesiastical authority and advocating communism, they allied with themselves vast numbers of the pauper populace, as well as serfs suffering under serious oppression. From hating the established order, they soon grew to hate all order. The sect spread rapidly in spite of the united efforts of Roman Catholics, Protestants, and civil magistrates. The crisis came in the "Peasant War" in south Germany, 1525. The battle of Frankhausen crushed the sect in Saxony and Franconia. Münzer, the Anabaptist leader, was put to death, with many of his followers who refused to recant. New associations were immediately formed; new leaders, Knipperdolling, Matthias, and Bockhold or Bockelson arose. Münster, in Westphalia, became the center of action. The established churches in this city were destroyed, the bishop expelled, all books but the Bible burned, and soon all sorts of excesses prevailed. The power of the Anabaptists was, however, of short duration. Several Protestant princes joined forces with the bishop, and the city was taken in 1535. The leaders were killed, and their bodies hung up in iron cages which are still preserved at Münster. Thus the kingdom of New Zion, as it was called, came to an end. The name Anabaptist was proscribed and severe measures taken to prevent any revival of the sect. The doctrines that gave the sect its name survived and the present Baptist church is doubtless an outgrowth of these views. Many other sects which reject infant baptism have been inaccurately classed with the Anabaptists.

The name at the present time is very commonly applied to the Mennonites. See MENNONITES; MORAVIA; BAPTISTS; MÜNSTER.

Anabasis, ȧ-năb′ȧ-sĭs, a literary name from the Greek, meaning literally a journey upward. Xenophon's *Anabasis* is an account of the unfortunate expedition of the younger Cyrus against his brother Artaxerxes, 401 B. C. It is written in a simple style. It is the first Greek prose usually read in preparing for college. Xenophon was one of the commanders of a force of 10,000 Greeks, who started from the coast of Asia Minor in the spring of 401 B. C. and marched as far as Cunaxa near Babylon, where Cyrus was killed and the Asiatic portion of his forces routed. The 10,000, however, held together in the face of a host of half a million Persians. After many hardships they regained their native land. The retreat is one of the most famous in history. In celebrity it ranks with Napoleon's retreat from Moscow. The expedition demonstrated the superiority of Greek discipline, and paved the way for the final conquest of Persia two generations later. See XENOPHON.

Anaconda, a huge water serpent of South America. It is allied to the boa constrictor, but is much larger. A specimen in the New York Zoölogical Park measures eighteen feet six inches. A stuffed specimen in the British Museum is twenty-nine feet long. The boa is a tree climbing serpent; the anaconda lives in the rivers. It is found chiefly in the basins of the Orinoco and Amazon. The anaconda is not venomous. Its usual food is the capybara, the tapir, and water birds. It is quite capable of making away with a deer, if it can catch one drinking at the water's edge or attempting to swim a river. The term anaconda may be applied to any large snake that throws its folds about its prey and crushes it. See PYTHON; BOA CONSTRICTOR; SNAKES.

Anaconda, Mont., is the home of the largest copper smelting works in the world —the Washoe Reduction Works of the Anaconda Mining Company. These works have a daily capacity of between 10,000 and 12,000 tons of the copper ore mined in the vicinity. The product comprises 10 per cent of the world's output of copper. Anaconda is 27 miles northwest of Butte. A small mining camp in 1880, it has developed into a modern city, the county seat of Deer Lodge Co. It has parks, a fair grounds, the State Fish Hatchery and a Hearst Free Library of 6,000 volumes. The census of 1920 gave the population as 11,668.

Anacreon, ă-năk′rē-on, a famous Greek lyric poet. He was born at Teos, Asia Minor, about 562 B. C., and died about 478 B. C., choked, Pliny tells us, by a grape seed. He was held in high esteem as a poet, both in his own age and in the ages that followed. Ancient writers call him "The Charming," "The Honey-tongued," "The Swan of Teos," "The Glory of Ionia." He was the author of many lyrics, and of satires as well. In the year 1554 Henry Stephens published a volume of Greek poems which purported to be the collected songs of Anacreon. They were translated into English by Cowley, Moore, and George Bourne. In modern times critics agree that these lyrics are by writers of a later century, and that a few genuine fragments only are found among them. All, however, are after the manner of Anacreon, and compare favorably with the few genuine verses extant. Moreover, these "Anacreontic Odes," whatever their authorship, are most graceful lyrics, ranking with the best of Greek poetry. They are chiefly in praise of love and wine. This fact has led both ancients and moderns to place an unjust estimate on the poet's character. Indeed, the citizens of Teos, his own countrymen, placed his effigy on their coins, portraying a coarse and brutal face, worthy of Silenus. In Athens a statue erected in his honor represented him as a drunken singer.

The songs themselves, however, contain nothing that is coarse or sensual. "The love-poems might be recited in the most modest household, and the drinking-songs sung at the most decorous banquet." It has been said of Anacreon that "he seems at least to have been sober when he wrote," and in one fragment, the poet himself condemns intoxication as fit only for "bar-

barians" and "Scythians." In another song occur the lines:

Let cheerful temperance rule the soul,
The best ingredient in the bowl.

The story runs that Anacreon was once charged with writing hymns to the reigning beauties of the day, instead of to the gods and goddesses. He made answer in these words, "But are not these also lesser divinities?"

The word Anacreontic is used to designate any short, sprightly song in praise of love or wine.

PLEA FOR DRINKING.

The Earth drinks up the genial rains,
Which deluge all her thirsty plains;
The lofty Trees that pierce the sky
Drink up the earth and leave her dry;
The insatiate Sea imbibes each hour
The welcome breeze that brings the shower;
The Sun, whose fires so fiercely burn,
Absorbs the waves, and in her turn
The modest Moon enjoys each night
Large draughts of his celestial light.
Then, sapient sirs, pray tell me why,
If all things drink, why may not I?

—*Transl. of Bourne.*

ON HIS LYRE.

While I sweep the sounding string,
While the Atridae's praise I sing—
Victors on the Trojan plain—
Or to Cadmus raise the strain,
Hark, in soft and whispered sighs,
Love's sweet notes the shell replies.
Late I strung my harp anew,
Changed the strings—the subject too.
Loud I sung Alcides's toils;
Still the lyre my labor foils;
Still with Love's sweet silver sounds
Every martial theme confounds.
Farewell, Heroes, Chiefs, and Kings!
Naught but Love will suit my strings.

—*Transl. of Bourne.*

Anae'mia, meaning literally without blood, but generally signifying a diminution in supply or a deterioration in quality. It may result from a diseased condition of the blood-making organs, but more often follows wasting diseases, as malaria, tuberculosis or cancer, or from metallic poisoning. Then it may also come from improper food, bad air or insufficient sunlight. If due to these latter causes, the remedy is apparent.

Anaesthetic, in surgery, an agent used to produce unconsciousness during an operation. The anaesthetics used chiefly are chloroform, ether, and nitrous oxide or laughing gas. The use of anaesthetics may be said to date from 1800, when Sir Humphry Davy recommended the employment of nitrous oxide to render patients insensible to the pain of operation. Local anaesthetics like cocaine are used to produce numbness in cases of slight operations.

An increasing number of major operations are performed under local anaesthesia. For instance, an amputation, or exploratory incision into the abdomen, or the removal of cysts or tumors in various situations is frequently carried out under local anaesthesia. Cocaine is still largely used, especially for operations on the eyes and the interior of the nose. Various cocaine substitutes have been introduced, one of the best being novocaine. There are also various combinations of novocaine with suprarenin, which are largely used in dental operations and spinal anaesthesia. Stovaine, Tropacocaine, and Eucaine are other valuable preparations that are often used in connection with adrenalin. See SURGERY; CHLOROFORM; ETHER; COCA.

Analogy, a form of reasoning which argues that because objects are alike in many known particulars, they are also alike in some other and unknown particular. An illustration of an argument by analogy is conveniently drawn from the earth and Mars. Both are planets; they revolve about the same sun; they have the same shape; each has an atmosphere; each has a regular succession of seasons. There is an apparent similarity of rainfall, temperature, and the same succession of day and night. Now the earth sustains plant and animal life. Reasoning by analogy, it is urged that Mars is also clothed with vegetation and is inhabited by animals and people. It may be seen readily that analogy is likely to be exceedingly useful in stimulating investigation and in leading to discovery, but that it does not give absolute proof. The analogy seems to be perfect and complete, yet no one knows whether or not Mars is inhabited.

Ananias, ăn-an-ī'as, in Bible history, a Jewish Christian at Jerusalem, who, with his wife, Sapphira, was struck dead for

ABDOMEN AND CHEST

misrepresenting the amount of their gifts to the Apostle Peter, Acts v: 1-11.

An'archist, one who professes to believe that rulers, and indeed all forms of government, are an unnecessary evil. The word is from the Greek, meaning without rule. Socialists would have the government do more than it does now; but the anarchists would abolish government and let each person enjoy the utmost freedom. The anarchist goes further. He holds that it is the inalienable right of each to rule himself without constraint from others. The anarchist looks upon government, not as a form of protection, but as a legalized scheme whereby the strong may plunder the weak. Under cover of law and government, so the anarchist claims, special privileges are granted to a few to the injury of the many. Two grievances may be given as illustrative of the wide range of complaint. By law a man may hold land he has no use for. By law a man may be compelled to go home or to a police station at eleven o'clock, when, as a matter of fact, he wants to stay all night in a saloon. Under the first law the rich man is protected unduly. Under the second law the poor man is harassed and oppressed unduly. For the policeman and the tax gatherer the anarchist would substitute utter freedom from control.

In a discussion of the topic it is important to distinguish between philosophical anarchists, who hold to the theory of no government, and violent anarchists, who would overthrow government by throwing dynamite. If all were minded to do the right thing it might be quite possible to do away with the police side of government; but there are so many enterprises, such as road making, supplying water, and transporting goods, that people can carry out to better advantage by working together, that there is still the need of coöperation, that is to say, of government. Our present form of government with its confessed inequalities and injustice is far better than no law save mob rule. Civilized people are giving attention to the problem of improving government, not of abolishing it.

See SOCIALISM.

Anat'omy, that branch of the study of organic bodies, both plants and animals, which deals with structure. The necessity of a knowledge of the human body by medical practicioners led to its early study, but mainly at first by the dissection of animals. Records of human dissection have come down to us from before the time of Aristotle, though the practice did not become general in medical departments of universities till the sixteenth century. The beautifully illustrated book of Vesalius published at this time may be said to have laid the foundation of our modern anatomy. From this time on the advances were rapid, some of the milestones along the way being William Harvey's discovery of the circulation of the blood in 1628; the application of the microscope to human structures by Malpighi and Leeuwenhoeck; the founding of comparative anatomy by Cuvier at the opening of the nineteenth century, and the beginning of histology or microscopic anatomy by the celebrated Bichat. A knowledge of structure led naturally to its process of building, or embryology, by which the simple cell became the complex organism, and further to the microscopic anatomy of diseased conditions embraced under the name pathology.

The vital organs of the chest and abdomen are shown in the cut, the left-hand figure showing those in front, and the right-hand those in the back part of the cavity.

KEY TO CUT.

Left-Hand Figure.	Right-Hand Figure.
1 Trachea.	1 Trachea.
2 Oesophagus.	2 Right Lung.
3 Bronchial Tubes.	3 Left Lung.
4 Right Lung.	4 Descending Vena Cava.
5 Left Lung.	5 Aorta.
6 Heart.	6 Pulmonary Artery.
7 Right Lobe—Liver.	7 Pulmonary Veins.
8 Left Lobe—Liver.	8 Left Auricle—Heart.
9 Gall Bladder.	9 Left Ventricle—Heart.
10 Stomach.	10 Right Ventricle—Heart.
11 Duodenum.	11 Right Auricle—Heart.
12 Small Intestines.	12 Diaphragm.
13 Appendix.	13 Ascending Vena Cava.
14 Ascending Colon.	14-15 Renal Capsules.
15 Transverse Colon.	16 Right Kidney.
16 Descending Colon.	17 Left Kidney.
17 Pelvis.	18 Pancreas.
18 Peritoneum.	19 Spleen.
19 Ribs.	20 Stomach.
20 Costal Arch.	21 Duodenum.
21 Diaphragm.	22 Costal Arch.
22 Pleura.	23-24 Ureters.
23 Collar Bone.	25 Common Iliac Vein.
	26 Common Iliac Artery.
	27 Bladder.

Anatomy of Melancholy, by Robert Burton published in 1621. See BURTON.

QUOTATIONS.

Naught so sweet as melancholy.
Rob Peter, and pay Paul.
Penny wise, pound foolish.
What can't be cured must be endured.
Matches are made in heaven.
Make a virtue of necessity.

Anaxagoras, an-aks-ăg′o-ras, a Grecian philosopher. He lived about 500-428 B. C. He was born in Clazomenae, a city of Ionia on the coast of Asia Minor. Anaxagoras was a friend of Pericles, and a constant visitor in his home. He was an admirer of Aspasia. He taught the doctrine that the ruling principle in the universe was a world-ordering mind. "In the beginning all things were chaos. Then came intelligence and set all in order." He inquired into the nature of comets, and tried to explain other natural phenomena. He held to the notion that the miraculous is simple enough and natural enough, if one can only get at the real facts in the case. Anaxagoras lived in Athens thirty years. Like Socrates, he was accused by his political opponents of impiety. He sought safety in Lampsacus, where his death took place. Although, at first thought, the gropings of the old philosopher may seem elementary, as a matter of fact Anaxagoras was a man of powerful mind, a leader of thought in an age of no little intellectuality. He was first of all an honest, determined investigator.

Anaximan′der of Miletus, a Greek philosopher. Born 611 B. C. Anaximander is celebrated for a work *On Nature.* His theory is interesting. He holds that the elementary contraries, warmth and cold, moisture and dryness, are derived from elementary principles unknown in quality and limitless in quantity. Through motions and condensations innumerable worlds have sprung into existence, in the center of which the earth, a cylinder in form, remains motionless, while all the other heavenly bodies revolve about it. According to this philosopher the earth was originally entirely fluid. As the water dried up, fishes made their appearance, and as part of the earth dried up, some of the fishes became land animals.

Ancestor Worship, acts of veneration paid to the spirits of the dead. Ancestral worship may be of three kinds, the first being fundamental, the others growing out of it:

1. Family worship of immediate ancestors, as parents and grandparents.
2. Clan worship of a departed chief.
3. National worship of an ancient ruler or rulers.

Ancestral worship seems to be the earliest form of religious emotion. It is held to be the foundation of all civilized religion, a stage through which all advanced religions must pass. It bears the same relation to religious thought, therefore, that the early ages of man bear to civilization. The nations of history were ancestor worshipers. The pre-Homeric Greeks, the inhabitants of ancient Mycenae, users of bronze and makers of pottery, buried their dead and worshiped them. The altars and ceremonial of the classic Greeks retained many traces of an earlier ancestral ritual. In connection with patriarchal government the ancient Romans developed an advanced type of ancestral worship. The Roman *manes* is the accepted word for ancestral deities. In order that the spirits might have a proper abiding place, and be propitiated, the Egyptians embalmed the bodies of the dead with care, and showed them the highest honor.

In all these nations, and among the Chaldeans, the Assyrians, and the Babylonians, as well, it was a part of proper burial to build an altar at the head of the tomb on which to place food, drink, and precious offerings. The worship of the Semitic peoples, the Hebrews and the Arabs, as history knows them, is remarkably free from ancestral deification; but the altar and its sacrifices, shewbread, and other ceremonials lead scholars to the conclusion that these people prove no exception to the general principle that all civilized nations have at one time practiced ancestor worship. The following passage quoted by Herbert Spencer from a German authority goes to show that the practice, often in a disguised form, still lingers in central Europe:

Roman Catholic peasants do not forget all

the year round to care for the welfare of the souls of their dead. The crusts of the table are collected throughout the week, and on Saturday night are thrown into the hearth-fire, that they may serve as food for the souls during the following holy day. Any soup which drops on the table . . . is left to the poor souls. When a woman prepares the dough, she casts behind her a handful of flour, and throws a piece of dough into the furnace; when she bakes little cakes, she puts some fat into the pan and the first cake into the fire. Wood-cutters put little pieces of bread which have become too dry, upon the tree trunks: all for the poor souls. . . . When the time of All Souls is approaching, the same care for the deceased is shown more vividly. In every house a light is kept burning all night; the lamp is no longer filled with oil but with fat; a door, or at least a window, remains open, and the supper is left on the table, even with some additions; people go to bed earlier,—all to let the dear little angels enter without being disturbed. . . . Such is the custom of the peasants of the Tyrol, Old Bavaria, Upper Palatinate, and German Bohemia.

The origin of ancestor worship is to be investigated, however, among more primitive people than those of history. The field of investigation is a wide one. Ancestral worship was, and is, practiced by the savage tribes of both Americas, of Africa, of Australia, and of Asia. It is doubtful whether there are any tribes so low in the scale of humanity as not to have notions of ghosts and the necessity of propitiating them.

The foundation of ancestor worship is a belief, however shadowy, in ghosts; a belief that the ghost hovers about the body it once inhabited and that it has a disposition and a power to help or to hinder for good or for evil, as in life, only more so. For this reason, call it abject fear, to begin with, the survivors treat the body of the dead, especially the body of one late in authority, as a father or a chief, with respect, make offerings of food and drink, employing the same arts to keep on the good side of the ghost that they did to secure the favor of the living. Veneration proceeding from affection and respect seems of later development. The earliest form of ancestral worship is the propitiating of authority. In the earlier stages of his development, the savage believes that the spirits are as capricious, as loyal, as jealous, and as vindictive as he is.

With the belief in ghosts, spirits, souls, *manes* of the fathers, is joined a belief in their activity and supernatural power. When good hunting and game scarcity, the speeding of an arrow and the failure to hit, victory in combat and disastrous ambush, the rotting of seed in the ground and the sprouting of seed, rain and drouth, harvest and starvation, fat flocks and animals dying of disease, health and pestilence, are not regarded as the outworkings of great and permanent forces of nature, but as the work of spirits once in the body, spirits good and spirits evil, spirits well disposed and spirits angered, it is not strange that propitiation of the dead should be the serious business of the living. In such a stage of thought no effort to please the dead is too great. Just where affection begins and fear leaves off, none can say. The Roman feared the omission of a single word or a mistake in a single gesture. The Egyptian even seated the mummy of his father at the table.

Among the lower tribes the spirits of ancestors were ever near at hand. The thought of a heaven and a hell, of an elysium for the souls of the just and a place of discomfort for the spirits of the unjust, is not primitive. The Indian, who provided game, pipe, bow, and arrows, that his father might have a prosperous passage to the happy hunting ground, is as far ahead of the Tasmanian in religious development as his bow and arrow are ahead of the rude tools of stone and shell used by the savage of the South Seas. As a general principle, we may assert that the more primitive a people, the greater their fear of ghosts, and the more abject their form of worship. As people advance, the belief in the active participation of the *manes* in life fades out. The worship of ancestry assumes more and more the form of affectionate remembrance.

Far more than half of the inhabitants of the world now practice ancestry worship in one form or another. The most complete type is the household worship of the Japanese. The following passages are taken, with trifling modification, from *Japan: An Interpretation,* by Lafcadio Hearn:

There survive in the Japanese ancestor-cult

these three beliefs, which underlie all forms of persistent ancestor-worship in all climes and countries:

1. The dead remain in this world,—haunting their tombs, and also their former homes, and sharing invisibly in the life of their living descendants.
2. All the dead become gods, in the sense of acquiring supernatural power; but they retain the characters which distinguished them during life.
3. The happinesss of the dead depends upon the respectful service rendered them by the living; and the happiness of the living depends upon the fufilment of pious duty to the dead.

These beliefs, in modified form, are yet a fundamental part of the existing cult. In every home, there is a shrine devoted to it. This shrine, a tiny model of a Shinto Temple, is placed on a shelf fixed against the wall of an inner chamber at a height of about six feet from the floor. Such a shelf is called a "Shelf of the August Spirits." In the shrine are placed thin tablets of white wood inscribed with the names of the household dead. Such tablets are called "spirit-sticks." The number of mortuary tablets in a household shrine does not generally exceed five or six,—only grandparents and parents and the recently dead being thus represented; but the names of remoter ancestors are inscribed upon scrolls, which are kept in the *Butsudan* or the *mitamaya*.

Whatever be the family rite, prayers are repeated and offerings are placed before the ancestral tablets every day. The nature of the offerings and the character of the prayers depend upon the religion of the household; but the essential duties of the cult are everywhere the same. These duties are not to be neglected under any circumstances: their performance in these times is usually intrusted to the elders, or to the women of the household. There is no long ceremony, no imperative rule about prayers, nothing solemn: the food-offerings are selected out of the family cooking; the murmured or whispered invocations are short and few. But, trifling as the rites may seem, their performance must never be overlooked. Not to make the offerings is a possibility undreamed of: so long as the family exists they must be made. It should be recognized that no religion is more sincere, no faith more touching than this domestic worship, which regards the dead as continuing to form a part of the household life, and needing still the affection and the respect of their children and kindred. Originating in those dim ages when fear was stronger than love,—when the wish to please the ghosts of the departed must have been chiefly inspired by dread of their anger,—the cult at last developed into a religion of affection; and this it yet remains. The belief that the dead need affection, that to neglect them is a cruelty, that their happiness depends upon duty, is a belief that has almost cast out the primitive fear of their displeasure. They are not thought of as dead: they are believed to remain among those who loved them. Unseen they guard the home, and watch over the welfare of its inmates: they hover nightly in the glow of the shrine-lamp; and the stirring of its flame is the motion of them. They dwell mostly within their lettered tablets;—sometimes they can animate a tablet,—change it into the substance of a human body, and return in that body to active life, in order to succour and console. From their shrine they observe and hear what happens in the house; they share the family joys and sorrows; they delight in the voices and the warmth of the life about them. They want affection; but the morning and the evening greetings of the family are enough to make them happy. They require nourishment; but the vapour of food contents them. They are exacting only as regards the daily fulfilment of duty. They were the givers of life, the givers of wealth, the makers and teachers of the present: they represent the past of the race, and all its sacrifices;—whatever the living possess is from them. Yet how little do they require in return! Scarcely more than to be thanked, as the founders and guardians of the home, in simple words like these: "*For aid received, by day and by night, accept, August Ones, our reverential gratitude.*" . . . To forget or neglect them with rude indifference, is the proof of an evil heart; to cause them shame by ill-conduct, to disgrace their name by bad actions, is the supreme crime. They represent the moral experience of the race: whosoever denies that experience denies them also, and falls to the level of the beast, or below it. They represent the unwritten law, the traditions of the commune, the duties of all to all: whosoever offends against these, sins against the dead. And, finally, they represent the mystery of the invisible: to Shinto belief, at least, they are gods.

Anchises, an-kī′sēz, in Greek legend, a prince of the royal house of Troy, and father, by Aphrodite, of Aeneas. He boasted of the favoritism of Aphrodite for himself, and, as a punishment, was struck blind. Aeneas carried Anchises on his shoulders from Troy while the city was burning.

Anchor, a heavy drag attached to a cable and thrown overboard to hold a ship from drifting. The first anchor was, no doubt, some rude weight, such as a stone; but the modern anchor is a heavy specimen of the blacksmith's art, combining several features suggested by centuries of experience. Lloyds, the London marine insurance association, prescribes not only the number but the weight of the various anchors to be carried by ships according to their tonnage. They are called stern, sheet,

and bower anchors, according to the part of the ship in which each is stored. The right bower is kept at the right side of the bow; a sheet anchor near the middle of the ship, and so on. A ship of 100 tons is expected to carry four anchors, the bowers weighing four hundredweight each. A ship of 3,000 tons is supposed to have seven anchors, the bowers weighing 4,500 pounds each, and so on. A sailing ship requires more in the way of anchors than is necessary for a steamship. A modern ironclad carries two bower, two sheet, two kedge, one stream, and one stern anchor. The kedge anchors are designed for use in warping the ship from one place to another. The cables are now almost universally iron chains with short links made with care of the best material.

A number of nautical terms are interesting. To cast or drop anchor is to lower it into the water. If the anchor stands on end without falling over, it is said to be a-peak. If it drags on the bottom without catching, it is said to come home. To weigh anchor is to draw it up out of the water. An anchor is fouled when it becomes entangled in its cable. A ship rides at anchor when its anchors hold it in position. In many harbors anchors are fastened permanently to the bottom, as in a ledge of rock, or they are made with a peculiar corkscrew shape and twisted into the mud. One end of a short cable is fastened to the anchor, the other is held at the surface by a buoy. When a ship ties up to a buoy of this sort, it is said to be moored.

An anchor is essentially a heavy hook that catches on the bottom when dragged. The best shape has been a subject of controversy for a long time. The most approved form consists of a shank terminating at one end in a ring for the cable. A curved crosspiece is fastened in a slot at the other end, in such a way that it is able to turn a short distance on a pivot. The arms end in broad, pointed, shovel-like palms called flukes. When either fluke catches in the bottom of the sea the crosspiece turns on its pivot until the other fluke comes against the shank, leaving no chance for the cable to foul. In order to prevent the anchor from falling sidewise so that neither fluke will catch, the ring end of the shank is fitted with a second crosspiece called a stock. The stock extends in a direction at right angles to that of the arms. When the anchor is cast, it is sure to tip over in such a way that the shank and stock lie flat, and turn one fluke or the other downward, so that it will catch and prevent the anchor from dragging. Good anchorage should be deep enough so that ships may pass above an anchor without injury, hard enough so that the anchor will not drag, and yet not too stony, lest the flukes be broken off in crevices of the rock. The parts of an anchor are made usually of a number of bars welded together. It was considered formerly a very difficult piece of blacksmithing to make an anchor, but they are forged now by steam hammers.

An anchor is weighed by winding up its cable on a cylinder, called a capstan. Formerly the capstan was turned by the sailors, who thrust their handspikes into its head and followed each other round and round in a circle, singing merry songs. In well equipped ships this work is now done by a small engine for the purpose. The stock is constructed usually so that it may be withdrawn on shipboard, with a view to stowing the anchor in a smaller space.

Anchorites, hermits; persons who withdraw from society. The exact time of the origin of this practice is questionable, but it probably came about as a result of the idea that all sorts of bodily privations, such as going without food, dressing in painful clothing, and scourging one's self with whips, were acceptable in the sight of God and merited salvation. Monks believed in withdrawing from general society and denied themselves many of the pleasures of life, that they might have the more time for meditation and good works; the anchorites went a step farther, they withdrew themselves from society altogether. In the warm region around the eastern end of the Mediterranean they betook themselves to inaccessible deserts, caves, or other deep solitudes, and lived on the roughest sort of fare. Now and then an anchorite acquired a reputation

for sanctity and was visited by sorrowing and sin-laden people, who made him a sort of father confessor, upon whom they might lay their burdens. The pillar saints were a set of anchorites who sought solitude by remaining on the top of pillars. One of the most remarkable, Simeon Stylites, remained in a cell in his monastery for nine years. He then withdrew to a pillar a yard in diameter about forty miles from Antioch, on the top of which he took up his position, removing every few years to a still higher pillar, until at last he remained day and night in all kinds of weather on the top of a pillar sixty feet high. His neck was loaded with iron chains; his lips moved in constant prayer; his body was bowed as though wrestling in agony for the forgiveness of sins. Frequently, it is said, he went without food for an entire week. His reputation for sanctity brought crowds of pilgrims who hoped to derive benefit from his prayers or even by touching the pillar on which so holy a man stood. After living this life for thirty-seven years, he died in 460, at the age of seventy-two. Many other pillar saints were scarcely less noted. See MONKS.

The fertile and peaceable lowlands of England . . . offered few spots sufficiently wild and lonely for the habitation of a hermit; those, therefore, who wished to retire from the world into a more strict and solitary life than that which the monastery afforded were in the habit of immuring themselves, as anchorites, or in old English "Ankers," in little cells of stone, built usually against the wall of a church. There is nothing new under the sun; and similar anchorites might have been seen in Egypt, 500 years before the time of St. Anthony, immured in cells in the temples of Isis or Serapis. It is only recently that antiquarians have discovered how common this practice was in England, and how frequently the traces of these cells are to be found about our parish churches. —C. Kingsley, *The Hermits.*

Anchovy, a small, silvery fish, four to five inches long, resembling the herring, the shad, the sprat, and the sardine. Anchovies have pointed heads and projecting upper jaws. In early summer shoals visit the shores of southern Europe to spawn. Immense numbers are taken with nets in the Mediterranean Sea. The fishermen toil at night, using bright headlights to attract the fish. The fish are salted and dried for winter use, or else pickled in small barrels for the export trade. Treated with vinegar they dissolve into what is known as anchovy sauce.

Ancient Mariner, The Rime of the, a poem by Samuel Taylor Coleridge, published in 1798. It is Coleridge's masterpiece and is probably the finest specimen of artistic ballad poetry in the language. See COLERIDGE.

Ancient Order of United Workmen, a fraternal, benevolent organization. The parent lodge was formed at Meadville, Pennsylvania, in 1868. The fundamental idea of the order is mutual helpfulness. Life insurance, conducted on the assessment plan, is an important feature. The family of the deceased member receives up to $2,000 a year. There are now 40 grand lodges, 4,500 sub-lodges, with a membership exceeding 400,000. The order has paid out in the neighborhood of $2,000,000 in benefits. The highest governing body of the organization is the "supreme lodge." This controls the grand, or state, lodges, which, in turn, have a supervisory relation to the local lodges.

Andersen, Hans Christian (1805-1875), a Danish writer. He is known as a poet and a novelist of no mean ability, but his fame rests on the volumes of fairy tales, which, like Dickens' Christmas stories, appeared from year to year in the holiday season. His stories of fir trees, storks, fairies, swans, witches, princes and princesses, soldiers, nightingales, flowers, and Christmas trees, gathered from the peasantry and dressed in the simplest language, are the delight of young readers in all lands. Andersen's old age was passed peacefully in Copenhagen, but his childhood was far from pleasant. He learned to read and write in a charity school. At the age of nine he went to work in a factory to earn something for the assistance of his widowed mother. He was an eager reader of the national ballads and popular poetry. In time he attracted the attention of a gentleman in public position, who placed him in a government school. From this he made his way through the university. Later in life he

received a royal pension, which gave him an opportunity to travel in Italy and elsewhere. His writings include, besides the *Fairy Tales, Picture-books without Pictures, Only a Fiddler, A Poet's Bazaar, My Life's Romance, The Ice Maiden,* and *Tales from Jutland.*

Anderson, Mary (1859-), an American actress. Her full name is Mrs. Marie Antoinette Anderson Navarro, but during her career on the stage she was called Mary Anderson, and although the name is a common one it will never be anything but most distinctive to those who have had the pleasure of seeing this gifted woman. She was born at Sacramento, California. Her father, General Anderson, was killed in the Civil War. The mother moved to Louisville, Kentucky, where the little girl was educated. When only thirteen years old she decided that she would become an actress, and had soon the good fortune to make the acquaintance of Charlotte Cushman, by whose advice she studied for the stage. She first appeared in the role of Juliet and won instant success. She was at this time but sixteen years of age, but in a few years was acknowledged to be the leading actress of the United States. Her popularity increased until she left the stage in 1889 upon marrying Mr. Navarro, whose full name is Antonio Navarro de Viana. They have made their home in England. Mary Anderson was something more than a gifted actress, she was a beautiful and noble woman. She kept her atmosphere pure and uplifting, and did much to destroy the prejudice felt by many right minded people against the stage, for she proved that an actress may live a pure and noble life and that the theater may not only amuse but instruct and elevate.

In 1896 Mrs. Navarro published a volume of reminiscences, *A Few Memories.*

Andersonville Prison, a Confederate States military prison for captured Federal soldiers during the Civil War. It was located at Andersonville, Georgia. The prison was notorious for unhealthfulness and the severity of discipline maintained. From February 15, 1864, to April, 1865, prisoners were received to the number of 49,485. Of these, 12,926 died from various diseases. The prisoners were confined in a space of about ten acres, without shelter from the sun, and with insufficient food and polluted water. The Confederates were short of money, clothing, food, and medicine for their own sick, not to say short of supplies for their men in the field. No one at this date desires to say aught against the kindness and hospitality of the South, but the management of Andersonville was execrable.

Anderson, Ind., a manufacturing city, situated on White River, a water power stream, 36 miles northeast of Indianapolis. Here was established one of the first and largest tin plate mills in the United States. Chief among Anderson manufactures are automobiles, magnetoes and self-starters for automobiles, oil and gas engines, street cars and steel springs. The city contains 13 public school buildings, including a manual training high school. Besides these, there are 6 parochial schools and 2 business colleges. The revenue from the municipally owned water works and electric light plant has enabled the city to discharge its debts. Population, 1920, 29,767.

Andes, the principal mountain system of South America. On the theory that a range of mountains is a wrinkle in the earth's crust, the Andes and the Rocky Mountains do not seem to be parts of the same great fold. Although intervening mountains connect the two systems, the southern extension of the Rocky Mountains sinks into the Pacific westward of South America. The general direction of the Andes, the countries traversed, and the table-lands inclosed, may be seen at a glance at the map. In height and extent the Andean system is second only to the Himalayas. In mass it may be compared with a huge embankment about 4,400 miles in length, having a width of from 20 to 250 miles, and an average height of nearly 2½ miles. The total bulk may be represented in cubic feet by the figure five followed by fifteen ciphers—a mass about equivalent to the silt that at its present rate would be carried downstream by the Mississippi in three-fourths of a million years. If all the rivers of the

world were to play on the Andes, they would require 135,000 years to sweep the mountains away; yet, as compared with the bulk of the earth, the entire range is but a blade of grass resting on a watermelon. For a great part of the length the Andes are a broad embankment from 6,000 to 11,000 feet high, with a ridge of peaks rising still higher, like battlements along either edge. Along the top of the embankment, and between these border walls, are the great upland plains or valleys in which, at their greatest expansion, Pizarro discovered an ancient civilization and effected the conquest of Peru. Bolivia and Peru border here.

The highest peak, not only of the Andes but of the New World, and the loftiest volcano in the world is Mt. Aconcagua, 23,080 feet above the sea. At the latitude of Lake Titicaca, one of the largest elevated lakes in the world, the Andean system is at its widest. Toward the north the border ranges approach and knot together in the vicinity of Quito, one of the most intensely active volcanic regions of the globe. Cotopaxi and Chimborazo are here. The equator here crosses an extinct volcano 19,534 feet above the sea. This is the greatest height attained by the equator in its entire course, and is the only region where the equator passes through perpetual ice and snow. By glancing at a map of South America it may be seen that from this knot the mountain ranges radiate like a fan through Colombia. At its southern termination the Andean system runs along the water's edge in a single high ridge, about twenty miles wide, to Cape Horn, though much broken by arms of the sea. The Strait of Magellan cuts off Tierra del Fuego altogether.

Andiron, an iron bar supported on three feet. A pair of andirons stood in every old-fashioned fireplace or open hearth to hold the burning logs of wood. The outer ends of the bars were turned upward to prevent the wood from rolling outward. Ordinarily they were plain iron bars shaped by the village blacksmith, but they were fashioned, not infrequently, with artistic care, the upright ends terminating in knobs, sheathed in brass or silver. Irving speaks of the care which the good Dutch housewives bestowed on the knobs of their andirons to keep them polished. See HEATING.

> And, for the winter fireside meet,
> Between the andirons' straddling feet,
> The mug of cider simmered slow,
> The apples sputtered in a row,
> And, close at hand, the basket stood
> With nuts from brown October's wood.
>
> —Whittier, *Snowbound.*

Andorra, än-dōr′rä, a mountain republic on the border line between France and Spain. It may be reached from France by a small river; from Spain by a dangerous mule path. It has an area of 175 square miles, and a population (1909) of 5,231. It is governed by a council of twenty-four members elected for four years by the heads of families in each parish. It is surrounded by high mountains, and has rich mines of lead and iron. The inhabitants are hospitable and industrious, and are engaged largely in farming and cattle raising. Andorra has been independent since the time of Charlemagne, although France and a Spanish bishop exercise a sort of joint protectorship. The customs and institutions have in many respects remained unchanged for centuries. They have been made the subject of study by a number of scholars and historians. The country has no written laws. The people are Catholics and speak the French language. There were originally a great number of these small states in medieval Europe. Andorra and one or two others are all that survive. The rest were absorbed by the larger states. It is claimed that descendants of petty German princes may be found driving street cars in Berlin.

Andover, Massachusetts, a town of Essex County, first settled in 1643. It was named for Andover, England, a market town in the vicinity of Winchester. It is a thriving town of about 7,500 inhabitants. It is noted for Phillips Academy, a strongly endowed school for boys. The academy has long maintained a reputation for scholarship, and is known usually as "Phillips Andover" to distinguish it from a similar school of the same name at Exeter, New Hampshire. The town is noted also as the seat of Andover Theological

Seminary, founded in 1807, a Congregational school, recently moved to Harvard University. The question of modifying the theological doctrines taught has given rise, at one time or another, to the famous "Andover Controversies." Successive generations have struggled, each to secure the acceptance of its views by the preceding generation, and then a few decades later taking the defensive against the younger men who were coming on. The town has several factories and a fine public library of over 12,000 volumes. Harriet Beecher Stowe lived here for a number of years, while her husband, Dr. Stowe, was professor of sacred literature in the Seminary.

André, än′drā, **Major John** (1751-1780), a British soldier. He was born of Swiss-French parentage in London, 1751, and was executed as a spy at Tappan, New York, October 2, 1780. He was an accomplished musician. He wrote facetious poems, arranged plays, and was a universal favorite with his fellow officers. When Benedict Arnold, in command of West Point, was meditating the surrender of that important fortress to the British, André, then Clinton's adjutant-general, was sent up the Hudson in a ship to arrange the details with Arnold. He entered West Point under a flag of truce. His ship, being fired upon by an American fort, dropped down the river, and André was obliged to return to New York by land. Arnold provided him with passports which carried him beyond the American lines. At Tarrytown, almost in sight of the British outposts, he was seized by three prowling American militiamen. He offered them a large sum to let him go free, but finding Arnold's traitorous dispatches in André's boots, they carried him to an American commander. The disguise and the traitorous correspondence left no doubt whatever that André was engaged in forwarding Arnold's infamous business. He was sent before a court-martial and was condemned to be hanged as a spy. His youth, popular ways, and influential family connections, were urged in vain. Washington offered, indeed, to exchange him for the traitor, Arnold, who had fled to the British. This Clinton refused. Washington felt that André must be executed as a warning. Finding that there was no hope, André met his fate with firmness. He asked as a last favor that he be permitted to die the death of a soldier, to be shot, instead of hanged, but his request could not be granted. André was buried at the foot of the gallows. In 1821 his remains were conveyed to England and deposited in Westminster Abbey. A memorial tablet, a sarcophagus with Britannia weeping, may be seen in the south aisle. Historical justice requires the statement that, had André escaped capture, his memory would have been linked with the infamy of Arnold; but the circumstances of his execution, though in accordance with the stern necessity of war, aroused the world's sympathy to such an extent that he is regarded almost as a martyr. To André's captors, John Paulding, David Williams, and Isaac Van Wert, Congress gave a pension of $200 a year and a silver medal. In 1853 a monument to their memory was erected at the place of capture. See ARNOLD.

Andree, Salomon Auguste (1854-), a Swedish scientist. Born in Grenna, October 18, 1854. He received a thorough technical education, and was a professor in the University of Stockholm from 1886 to 1889. In 1892 the Swedish Academy of Sciences made him a special grant for the purpose of experimenting in aerial navigation. In 1895 he laid before the academy a plan for seeking the north pole by means of a balloon. A grant of $40,000 was raised at once by popular subscription. He constructed an immense balloon sixty-seven feet in diameter, with a capacity of 170,000 cubic feet. July 11, 1897, Andree started north from Dane's Island, Spitzbergen, with two companions. While in sight, his balloon traveled at from twelve to fifteen miles an hour, which should have brought him to the pole in about six days. Two days after he left, a carrier pigeon returned with a message to the effect that at noon, July 13th, the daring navigators were in latitude 82.2°, longitude 15.5° east, and were making excellent progress.

In their balloon were 13 buoys, which were to be dropped at intervals. Five came ashore at Spitzbergen, but the bodies of Andree and the others were never found.

Andrew, Saint, one of the twelve apostles. He was noted for good sense and a meditative disposition. The principal allusions to Andrew are John i: 40; John vi: 8; John xii: 22; Mark xiii: 3. Tradition has it that he preached the gospel in the countries north of Greece, and that he suffered martyrdom on the cross. The Russians consider him the founder of their church. St. Andrew is the tutelary saint of Scotland, as are St. George for England and St. Patrick for Ireland. Saint Andrew's day, November 30, is observed in the Roman, Greek, and Anglican churches. The silver cross of St. Andrew, carried by the Scots to battle, had the form of the letter X on a blue ground. Saint Andrews, a city in Fifeshire, is noted as the seat of a Scottish university and as a center of the manufacture of golf clubs and balls.

Andrews, Elisha Benjamin (1844-1917), an American educator and college president, was born at Hinsdale, New Hampshire. During the Civil War he served in the Union Army and rose to the rank of second lieutenant. After the war he was graduated from Brown University, Providence, Rhode Island, and continued his studies at Newton Theological Institute. He was appointed professor of history and political economy and finance at Cornell, and later was made president of Brown University, which institution developed rapidly under his administration. Dr. Andrews was superintendent of the Chicago public schools for two years, and in 1900 accepted the position of chancellor of Nebraska University, from which he retired in 1909. He was the author of several books on history and economics; among them *A History of the United States in Our Own Times, An Honest Dollar, Wealth and Moral Law.*

Androcles, ăn′drō-clēs, or **Androclus,** a Roman slave whose story is told by Aulus Gellius, a Latin author, who lived and wrote in Athens in the latter half of the second century. Gellius' work *Noctes Atticae* contains many anecdotes, some of which are more interesting than authentic. They have little value as literature, but have aided in settling some debated questions concerning ancient history and literature. Gellius' account of Androcles is a pleasant tale. He ran away from his master and sought freedom in Africa. He once entered a cave to seek shelter and found therein a lame lion. Man and beast seemed to have no fear of each other and presently the lion offered his foot for inspection. Androcles found it pierced with a sharp thorn which he carefully removed, and then in gratitude the lion brought Androcles food as long as the Roman remained in the region. The runaway slave was captured, however, and taken back to Rome. Here according to custom he was condemned to fight with a lion in the amphitheater. The lion had been long kept without food to increase its ferocity, but as soon as he sprang into the amphitheater he recognized Androcles and instead of attacking him he fawned at his feet and licked his hand. The wonder of the spectators demanded an explanation. The story was told, Androcles was pardoned, and both man and lion set at liberty.

Andromache, ăn-drŏm′ȧ-kē, in Greek legend, the wife of Hector of Troy. She is one of the finest female characters in Greek literature. She was a daughter of the king of Thebes, and suffered much at the hands of Achilles. During her childhood he slew her father and seven brothers. During the siege of Troy he slew Hector. After the siege of Troy she passed into the possession of Pyrrhus, the son of Achilles, who, however, bestowed her in marriage on Helenus, a brother of her dead husband. As his wife she appears in Virgil's *Aeneid.* Andromache's grief for her dead husband, Hector, is the theme of one of the finest passages in Homer's *Iliad.* The following is from the translation by Alexander Pope:

First to the corse the weeping consort flew;
Around his neck her milk-white arms she threw,
"And oh, my Hector! Oh, my lord!" she cries,
"Snatch'd in thy bloom from these desiring eyes!
Thou to the dismal realms forever gone!
And I abandon'd, desolate, alone! . . .
Why gav'st thou not to me thy dying hand?

And why receiv'd not I thy last command?
Some word thou would'st have spoke, which, sadly dear,
My soul might keep, or utter with a tear;
Which never, never could be lost in air,
Fix'd in my heart and oft repeated there!"

See EURIPIDES.

Andromeda, ăn-drŏm′e-dȧ, in mythology, the daughter of Cepheus and Cassiopeia, monarchs of Ethiopia. She was bound to a rock as an offering to a destroying monster that was ravishing the land, and was rescued by Perseus. After death she was placed in the sky as a constellation, where she is now surrounded by her husband, mother, Pegasus, and other demigods. The name has been given to a genus of shrubs belonging to the heath family. The stagger bush of North America, so called from the effects of its leaves when eaten by sheep, is an Andromeda. See CASSIOPEIA; PERSEUS.

Andros, Sir Edmund (1637-1714), an English governor of American colonies. He became governor of the colony of New York in 1674, which position he filled for eight years. Although he displayed considerable ability and was honest and upright, his rule was severe. He gave little heed to the wishes of the colonists, and was finally removed by reason of political quarrels. In 1686 he was made governor of New England, at that time one province. Here the characteristics which had made him disliked developed into actual tyranny, and he held the position but three years. It was during this time that he undertook the well-known expedition to Hartford, which made the "Charter Oak" historic. Later Andros was made governor of Virginia, where he served wisely and justly for six years. See CHARTER OAK; HARTFORD.

Anemom′eter, (Gr. *anemos,* wind, and *meter,* measure), a scientific instrument for measuring the velocity of wind. The kind in use by the United States Weather Bureau consists of four hemispherical cups facing in the same circular direction at the ends of horizontal arms or spokes of a light wheel. The wind catches with more force in the opening or concave face of the cup at one end of a diameter than on the bottom or convex face of the cup at the other end of the same diameter, thus causing the wheel to rotate continuously in the same direction. The higher the wind, the faster the wheel turns. A system of clock work shows the number of rotations per minute, from which the velocity of the wind is computed readily. It is interesting to know that the inequality of wind pressure on the opposing pair of cups results in a rotary speed of from one-fourth to one-third of the velocity of the wind. Another anemometer consists of a lightly rotating, delicate wheel, each spoke of which is a flat blade set obliquely like the sail of a windmill. Such an instrument is held in the hand and is used chiefly by engineers and architects to measure the rate of air currents in mines or in ventilating shafts.

Anemone, ȧ-nĕm′o-ne, a genus of plants belonging to the buttercup family. The name is Grecian, signifying wind. In Grecian mythology the anemone was said to have sprung from drops of blood from the foot of Venus who had stepped on a sharp thorn. There are many anemones or windflowers. Some of them have become beautiful inmates of the flower garden. Anemones are without petals, but have a colored calyx that looks like a corolla. The sepals can hardly be told from petals. Our windflower comes early in the spring and is often called the wood anemone. It is found everywhere in our hardwood region. Another anemone, the pasque flower, with its purplish sepals and silky involucre, is the earliest flower of the prairies from Illinois and Missouri far to the north and westward. The seeds have long feathery tails. Other anemones, coming in the summer, ripen cylindrical heads of cottony seeds. See ACONITE; BUTTERCUP; LARKSPUR.

Aneroid Barometer. See BAROMETER.

Angelico, ȧn-jel′ē-kō, **Fra** (1387-1455), a famous Italian painter. The full name given him in his own time was Il Beato Fra Giovanni da Fiesole, which being translated is "The Beautiful Friar John, the Angelic, of Fiesole"; Fiesole was the town where he took his vows and became a Dominican monk He is sometimes

known as "Fiesole" simply, but in modern times Fra Angelico is his most common name. To "beatify" is an ecclesiastical process of the Roman Catholic Church by which one who has died is pronounced as "blessed," a step on the road to saint-hood. The painter friar's other name, "The Angelic" was given him at an early date on account of the beauty of the saints and angels which he painted. His surname was Guido, but that was of course given up for "Friar John" when he took his vows. Fra Angelico was employed by Cosmo de Medici to paint the frescoes in the convent of San Marco at Florence and in the church of Saint Annunziata. Pope Nicholas V invited him to Rome to ornament his private chapel in the Vatican. Many of his pictures are preserved in European galleries; *The Last Judgment,* the *Madonna of the Star,* and the *Coronation of the Virgin* are among them. The representation on canvas of his spiritual conception was his form of religious expression. He never took money for his work, and always prayed before beginning a new picture. Fra Angelico's "angels" are known and loved by all who love art.

Angell, George Thorndyke (1823-1909), a noted friend of dumb animals. He was born in Southbridge, Massachusetts. He died in Boston. He was graduated at Dartmouth in 1846. He was educated as a lawyer, but gave his life to the prevention of cruelty to animals. He founded the American Humane Educational Society and distributed leaflets by the million. In 1866 he established the periodical known as *Our Dumb Animals.* He gave wide currency to *Black Beauty,* Anna Sewall's famous plea for kindliness to horses. He traveled widely, and was instrumental in forming over 70,000 juvenile Bands of Mercy. Mr. Angell was a zealous reformer, but he was also a man of force, character, and sincerity. His work amounted to something. His funeral was a striking one. In the long procession that moved from Copley Square to Mount Auburn were thirty splendid work horses with shining coats and polished hoofs. They wore nothing but bridles, to which were fastened black rosettes. The ring of their shoes on the asphalt pavement was a fitting requiem for their lifelong friend. See BERGH; BLACK BEAUTY.

Angell, James Burrill (1829-1916), an American educator, and college president. He was born at Scituate, Rhode Island. His education was received at Brown University, and after graduation in 1849 he spent two years in European travel and study. He was then made professor of modern languages and literature at his alma mater. During the Civil War he edited the *Providence Journal,* in 1866 became president of the University of Vermont, and five years later accepted the presidency of the University of Michigan. To president Angell is due the advancement of that state institution to the front rank among the universities of the country. Aside from his work as an educator President Angell has showed himself a successful diplomat in the various positions he has held. He was United States minister to China 1880-81, member of the Anglo-American commission on Canadian fisheries in 1887, chairman of the Canadian-American commission on a deep waterway from the Great Lakes to the sea in 1896, and was appointed minister to Turkey in 1897, but gave up the position and returned to the University of Michigan. He resigned, however, in 1909 and was made President Emeritus. Dr. Angell has contributed many articles to the *North American Review* and other periodicals, and has published *A Manual of French Literature,* and *Progress of International Law.*

Angell, James Rowland (1869-), an American psychologist and the president of Yale University. He was born at Burlington, Vt. In 1890 he was graduated from the University of Michigan; and did post-graduate work at Michigan, Harvard, Berlin, and Halle universities, and in Paris, Leipzic and Vienna. In 1893, Dr. Angell was instructor in philosophy at the University of Minnesota. In 1894, he began a long term of service at the University of Chicago. He was assistant professor of psychology, and director of the psychological laboratory in 1894, associate professor of psychology in 1901, and professor and

head of the department in 1905. He was appointed senior dean of the University of Chicago in 1908, and dean of the University faculties in 1911. Dr. Angell was acting president of the University of Chicago during 1918-19, and in 1921 was elected to the presidency of Yale University. He is the author of *Psychology,* the fourth edition of which was published in 1908; and of *Chapters from Modern Psychology,* published in 1911.

Angelus, an′je-lŭs, **The,** a famous painting by the French artist, Jean Francois Millet. The word angelus designates a prayer recited by Roman Catholics at morning, noon, and evening. The opening words of the prayer are "Angelus Domini nuntiavit Mariae," "the angel of the Lord announced to Mary," and is in the memory of the annunciation to Mary that she was to be the mother of Christ. It was customary in France to ring the parish bell at the hours for the prayer, and at the sound of the bell every occupation ceased, while the prayer was repeated devoutly. In his picture Millet represents two peasants, man and woman, stopping their work in the potato field and reverently bowing their heads in prayer as the bell sounds. The picture brought Millet but a small sum of money. It was sold later at auction and exhibited in the United States. In 1890 it was purchased by M. Chanchard for $150,000, and returned to Europe. See MILLET.

Anglesey, ăn′gl-sē, an island in the Irish Sea. It is separated from the mainland of North Wales by the Strait of Menai. It is about twenty miles long by seventeen broad, and is very productive, raising large crops of oats, barley, turnips, and potatoes. The central or more elevated portion of the island yields valuable copper, lead, and silver ores, besides limestone, marble, asbestos, marl, and granite. The interior affords excellent grazing for cattle and sheep. Welsh is the language of the peasantry. Anglesey, or rather the harbor of Holyhead, is the terminus at which railroad passengers from London take ship for Ireland. Trains cross Menai Strait to Anglesey, through the famous tubular bridge, a remarkable piece of engineering. The railroad track is laid inside of a huge steel tube supported on piers of masonry at a great height above the water. One of the finest suspension bridges in the world also crosses the strait. Its roadway is 580 feet in length from pier to pier and swings 100 feet above high tide. Large sea-going ships are able to pass under both bridges. The island of Anglesey was an ancient seat of the Druids. A Druidical pontiff lived in security here, and a Druidical college was located on the island. Agricola subdued the Druids in the year 85 A. D. See DRUIDS.

Anglin, Margaret (1876-), one of the most distinguished of American actresses, was born at Ottawa, Can. She made her stage debut in New York in *Shenandoah,* in 1894. She has been leading woman with E. H. Sothern and Richard Mansfield; has acted the title role in *Zira;* has made a successful Australian tour; and at various times has appeared in *Antigone, Electra, Iphigenia in Aulis* and *Medea,* at the Greek Theatre in Berkeley, Cal. In 1919, she appeared in *The Woman in Bronze.* Of this celebrated woman, Mme. Bernhardt said, "She is one of the few dramatic geniuses of the day."

Angling, the catching of fish with hook and line as a pastime or recreation. Fishing may be engaged in as a commercial enterprise, but the word angling is employed only when the fisherman's object is sport, pure and simple. It would seem that angling is as old, almost, as the world itself, although history does not recount its origin. Certain it is that the ancient Egyptians enjoyed the sport. In the Old Testament the prophet Isaiah foretelling "the burden of Egypt" says that "the waters shall fail from the sea, the river shall be wasted and dried up . . . the brooks shall be emptied . . . everything sown by the brooks shall wither, and all they that cast angles into the brooks shall lament." Since ancient times the sport has been practiced almost universally. As Grover Cleveland tells us there "is an occult and mysterious instinct" leading men to love it. Moreover, it is an amusement that may be indulged in by anyone.

Angling has furnished the theme for poem, essay and story, and has afforded endless happy digressions in books otherwise too dull for reading.

"Fish are constantly doing the most mysterious and startling things; and no one has yet been wise enough to explain their ways or account for their conduct. In these circumstances fishermen necessarily see and do wonderful things. If those not members of the brotherhood are unable to assimilate the recital of these wonders, it is because their believing apparatus has not been properly regulated and stimulated. Such disability falls very short of justifying doubt as to the truth of the narration. The things narrated have been seen and experienced with a fisherman's eyes and perceptions. This is perfectly understood by listening fishermen; and they, to their enjoyment and edification, are permitted by a properly adjusted mental equipment to believe what they hear."—*Grover Cleveland.*

"The pleas'nt angling is to see the fish
Cut with her golden oars the stream,
And greedily devour the treacherous bait."
—*Much Ado about Nothing* Act III, Sc. 1.

"Angling is somewhat like poetry, men are to be born so."—Walton, *The Complete Angler.*

"We may say of angling as Dr. Boteler said of strawberries: 'Doubtless God could have made a better berry, but doubtless God never did'; and so, if I might be judge, God never did make a more calm, quiet, innocent recreation than angling."—Walton, *The Complete Angler.*

Anglo-Saxon, a name given to the Germanic peoples who migrated to Britain from a country about the mouth of the Elbe and the Weser. They were attracted at first by love of plunder. Under Roman protection the Britons had cultivated fields and fair towns. The rude Teutons came, first of all, to carry away grain, cattle, and clothing. About 449 a horde under Hengist and Horsa settled down on the east coast permanently. Others followed. The chief tribes were the Angles, the Jutes, and the Saxons. The Jutes settled in the district between the Thames and the Strait of Dover, around Canterbury. The Saxons occupied the country about London, westward and southward. Winchester was their old capital. The Angles, who later gained leadership and gave their name to the country, occupied the eastern coast of England from the territory of the Saxons northward to the Scottish border. York lies within this district. The following picture is drawn by Taine in his *English Literature:*

Picture, in this foggy clime, amid hoar-frost and storm, in these marshes and forests, half-naked savages, a kind of wild beasts, fishers and hunters, but especially hunters of men; these are they, Saxons, Angles, Jutes, Frisians; later on, Danes, who during the fifth and the ninth centuries, with their swords and battle-axes, took and kept the island of Britain. . . . Huge white bodies, cool-blooded, with fierce blue eyes, reddish flaxen hair; ravenous stomachs, filled with meat and cheese, heated by strong drinks; of a cold temperament, slow to love, home-stayers, prone to brutal drunkenness: these are to this day the features which descent and climate preserve in the race.

Without doubt the early invaders were mere pirates, like the Normans who settled on the coast of France. Although they were barbarians, they were much more advanced than were the Britons before the Romans occupied the island. They carried iron weapons. Their knowledge of blacksmithing enabled them to point wooden plows with metal tips. They soon settled down to till the soil. The warriors parceled out the fields of the Britons into strips convenient for plowing. Instead of crowding into towns, they scattered throughout the country, each landholder building a house of logs or hewed timbers.

Typical Anglo-Saxon society consisted of nobles, freemen, and serfs. The nobles, or earls, chose one of their number as king or chief magistrate. He was considered in no way superior to his neighbors. The idea of the divine right of kings was entirely wanting. These earls formed an aristocracy, but within their own circle they were quite democratic. The freemen were small landholders, mechanics, and the like. They ranged themselves usually under the protection of an earl, or over-lord. The serfs were agricultural laborers, little better than slaves. Many were prisoners of war, or persons convicted of crime. They were transferred with the land, and were forbidden to leave the premises of a master without his permission. Custom permitted a master, however, to give a serf his freedom and convert him into a freeman. A thrifty serf might hope to purchase his freedom.

The chief occupations were, of course, agriculture and fishing. The old records make mention, however, of gardens, orchards, vineyards, manufactures of cloth-

ing, salt works, tapestry, hangings, and expensive tableware. The common people drank ale and cider. The nobility indulged in wine. As compared with the Normans, the Saxons wore their hair long and dressed in loose, flowing garments of linen and wool. Silk garments and embroidery were confined to the wealthy. It is fair to say that the liberty-loving spirit and the faculty for local government possessed in a high degree by Great Britain and all its colonies, including the United States, has been inherited from the Anglo-Saxons. The strong sense of personal equality for which English speaking people are noted is of Anglo-Saxon origin.

The Anglo-Saxon invasions lasted for three centuries. The conversion of the people of the British Isles to Christianity began toward the close of the sixth century. The first mission was opened by St. Augustine at Canterbury. The Archbishop of Canterbury is still the official head of the English church.

The Anglo-Saxon language was not so much a language as a number of dialects, for which the name Old English is now the usual term. In general, Old English resembles the German in pronunciation, vocabulary, and grammar. So far as records go, the traditional poetry of the Anglo-Saxons was reduced to writing first at Whitby, in Northumbria, about 658-680. The Roman alphabet was used. Anglo-Saxon prose dates from the reign of King Alfred in southern England, 871-901. As a matter of fact the Saxon speech of Alfred has become the literary speech of England. The Anglian speech of Northumbria may be traced in the York dialect and in the Lowland speech of Burns and other Scottish writers.

A feature which at once struck him [Tacitus] as parting them from the civilized world to which he himself belonged, was their hatred of cities, and their love even within their little settlements of a jealous independence. "They live apart," he says, "each by himself, as woodside, plain, or fresh spring attracts him." And as each dweller within the settlement was jealous of his own isolation and independence among his fellow settlers, so each settlement was jealous of its independence among its fellow settlements. Of the character of their life in this early world, however, we know little save what may be gathered from the indications of a later time. Each little farmer commonwealth was girt in by its own border or "mark," a belt of forest or waste or fen which parted it from its fellow villages, a ring of common ground which none of its settlers might take for his own, but which sometimes served as a death-ground where criminals met their doom, and was held to be the special dwelling-place of the nixie and the will-o'-the-wisp. If a stranger came through this wood, or over this waste, custom bade him blow his horn as he came, for if he stole through secretly he was taken for a foe, and any man might lawfully slay him. Inside this boundary the "township," as the village was then called from the "tun" or rough fence and trench that served as its simple fortification, formed a ready-made fortress in war, while in peace its entrenchments were serviceable in the feuds of village with village, or house with house. Within the village we find from the first a marked social difference between two orders of its indwellers. The bulk of its homesteads were those of its freemen or "ceorls"; but amongst these were the larger homes of "eorls," or men distinguished among their fellows by noble blood, who were held in an hereditary reverence, and from whom the leaders of the village were chosen in war time, or rulers in time of peace. But the choice was a purely voluntary one, and the man of noble blood enjoyed no legal privilege among his fellows. The holdings of the freemen clustered round a moot-hill or sacred tree where the community met from time to time to order its own industry and to frame its own laws. Here plough-land and meadow-land were shared in due lot among the villagers, and field and homestead passed from man to man. Here strife of farmer with farmer was settled according to the "customs" of the township as its "elder men" stated them, and the wrong-doer was judged and his fine assessed by the kinsfolk; and here men were chosen to follow headman or ealdorman to hundred court or war. It is with a reverence such as is stirred by the sight of the head-waters of some mighty river that one looks back to these tiny moots, where the men of the village met to order the village life and the village industry, as their descendants, the men of a later England, meet in Parliament at Westminster, to frame laws and do justice for the great empire which has sprung from this little body of farmer-commonwealths in Sleswick.—John Richard Green, *Short History of the English People.*

Angola (Portuguese West Africa), has been under Portuguese rule since 1575, with the exception of the years 1641 to 1648 when it was held by the Dutch. The colony has an area of about 491,000 square miles, and a coast line of 1,000 miles. It lies between 6° and 17° South latitude, and from 12° to about 25° East longitude. The surface of Angola is extremely moun-

tainous in the western part, some of the peaks rising as high as 8,000 feet. The coast line is indented by numerous good harbors, the most notable of which are Sao Paulo de Loanda, Lobito, Benguela and Mossamedes. There are several rivers, but they are mostly short and shallow, drying up in the hot season; only two, the Kuanza and the Kunene, both flowing into the Atlantic, are navigable.

The climate of Angola is tropical, but varies somewhat owing to the uneven character of the land surface. Rainfall is heavier in the north and along the coast than in the interior.

Chief among Angola's agricultural products are coffee, rubber, tobacco, cotton and sugar cane. Cotton growing has been neglected for some years, but is now reviving. The supplies of rubber, however, are rapidly diminishing. Vegetable oils, wax, dried fish and cocoanuts are also important products. Mineral deposits include iron, copper, malachite, salt and gold. The principal imports of the colony are textiles, and the principal exports are coffee and rubber, though large quantities of dried fish are also exported. The trade of Angola is largely with Portugal.

The colony is administered by a High Commissioner, who resides at Loanda, and who is vested with large powers. For purposes of administration, it is divided into eleven districts. The chief city is Sao Paulo de Loanda; other important towns are Novo Redondo, Cabinda, Ambriz, Benguella and Port Alexander. The population is estimated at 2,250,000.

Efforts toward educational advancement for the natives are made by the home government, and it is estimated that there are now fifty-two government schools, and seven municipal and two private schools in the colony. Various missions have also been established. The military force varies between 2,000 and 4,500 men, almost all natives.

Almost all the overseas trade of Angola is in the hands of the Portuguese; but three British lines and one German line of steamers call at ports of the colony. It has a half dozen railway lines, totaling 818 miles. The government purchased the Trans-African Railway in 1918. The colony has cable connections with East, West and South African telegraph systems.

Angora, an ancient town in Asia Minor, which was formerly of commercial and political importance. It is situated in the mountainous interior, 220 miles southeast of Constantinople. About 300 B. C. Angora was a flourishing city under the Persians. In 277 B. C. it became the capital of the Gallic Tectosages. The city was an important trade center under the Romans, and was the capital of the Roman province of Galatia Prima. It was also the seat of one of the early Christian churches. During the Roman occupation a beautiful marble temple dedicated to Rome and Augustus was built by the citizens. In this temple in 1553, inscriptions in Latin and Greek setting forth the deeds of Augustus were discovered by the Dutch scholar, Busbeeg.

There are numerous ruins in Angora and remains of Byzantine architecture; also a few relics, both Greek and Roman. The vilayet of Angora of Old Turkey had a population of 932,800.

With the decline of the Roman empire, Angora lost its prestige, and in modern times it has been known as one of the main trading centers in this part of the Turkish empire. Before the World War the population was about 30,000, most of whom were Armenians. The fortunes of war did not deal kindly with Angora, and in 1915 a portion of the city was destroyed. The present city is described as a snowy blanket of flat roofs tilted upon its hill, pierced with minarets and cypresses.

Angora in 1921 again became prominent as the capital of the reorganized Turkish government under Mustapha Kemal. This small city suddenly assumed the political importance held for centuries by Constantinople, and in 1923 it was the chief center of political influence in the Near East.

Angora is famed for the celebrated long-haired goats bred there, the Arab name for which is chamal goat, meaning silky or soft. The hair is about 8 inches long and is shorn twice a year. The dogs, cats and rabbits

of this region are also long-haired, but it is said that when they are removed to other countries they lose this peculiarity; but this is not the case with those that have been introduced into Cape Colony. Goat's hair forms an important export, other exports being goat's skins, dyestuffs, principally madder, and yellow berries; mastic, tragacanth, and other gums; also honey and wax.

Angora Wool or **Mohair,** the hair or wool of the Angora goat, a native of Asia Minor. In its best condition the fleece of this goat is white, from four inches to one foot in length, strong, fine, and very silky. It hangs in long spiral ringlets that, when ready for shearing, nearly touch the ground. The most important characteristics of mohair are brilliancy, durability, and elasticity. These qualities make the fabric peculiarly adaptable to certain uses, so that as a raw material, mohair is quite as distinct as silk, wool, cotton, or linen. It does not mat or felt like wool, although it is as durable. It is not as soft and flexible as silk, although almost as lustrous. It can be made into a fabric nearly as light in weight as cotton or linen, but much stronger than either, and as capable of shedding dust.

The uses of Angora or mohair are many. It is especially adapted for pile fabrics, such as Utrecht velvet, various kinds of plush, lap robes, and upholsteries. The best mohair plushes are almost indestructible. Such plushes, in use as seat coverings in certain railway cars, have stood constant wear for more than twenty years. Mohair is used also for manufacturing dress goods, braids, trimmings, shawls, rugs, yarns, imitation furs, hosiery, coat linings, and cloakings. The long hair of the old Angora bucks and wethers is used for doll's hair, wigs, and artificial gray hair. It is much in demand for these purposes, selling at from fifty to seventy-five cents a pound.

The word mohair is in common use to describe a special variety of dress goods. It designates a light weight, lustrous textile with warp of cotton and weft of mohair, alpaca, or English luster wool. This fabric, usually plain, is often figured.

It has been estimated that something like 24,000,000 pounds of Angora wool is produced in the world annually. About half of this is the product of South Africa, 10,000,000 pounds the product of Turkey, and the remainder the product of other countries. The United States furnishes about 800,000 pounds.

See ALPACA; GOAT; PLUSH; BRILLIANTINE.

Anhin'ga, an aquatic bird allied to the cormorant. From its long snaky head and neck, it is called the snakebird. It is also called a water-turkey. Length, thirty-four inches. Plumage, glossy black, with silvery markings. It is found in the Gulf States and in the Orinoco region. It flies, perches, and dives, but seldom swims. Its favorite perch is a dried limb overhanging a river or bayou. On the approach of a strolling hunter or boatman, it drops into the water, feet first, head and neck erect. After a time it rises to the surface, exposing only its long, sharp bill and a wary eye. It lives on fish, which it pursues under water with speed. In pursuit the neck is curved backward, but on nearing its prey, the head darts forward with a stroke like that of a dagger. The bird then rises to the surface, tosses the fish into the air, catches it head first, and that is the end of the fish. The anhinga lays two to four eggs in a nest of sticks lined with moss, in a bush overhanging the water.

Aniline, ăn′ĭ-lĭn, an oily, colorless liquid, discovered as a product of the distillation of indigo in 1826. Chemically it is composed of carbon, nitrogen, and hydrogen in the atomic proportions of 6, 1, and 7. The new substance at once attracted attention from chemists, although at first it was of no value commercially. Eight years after the first discovery of aniline, it was found to exist in small quantities in coal tar. The scientist who proved this fact noticed also that aniline gives brilliant colors when brought into contact with chloride of lime. The next step was the discovery that aniline could be manufactured from benzol, another product of coal tar. Since no practical use was made of aniline, the importance of this discovery

was not realized, until, in 1856, a beautiful mauve or purple dye was made from it. Aniline acquired commercial importance immediately. Soon experiments resulted in the discovery of a series of brilliant dyes of almost every conceivable color, tint, and shade. These colors received in several instances fanciful names. Magenta and solferino are named from battles of the French-Austrian War, which were fought about the time of their discovery. Others, as azuline, violine, and emeraldine were derivations of the names of existing colors.

Several series or classes of colors have been produced since that time from coal tar products other than aniline. Each of these series has its chemical name, but they are all classed under the term, coal tar colors or coal tar dyes. The popular name of aniline dyes is inaccurate, as it includes properly only one series of these dyes. Aniline dyes, the first of these colors to be discovered, may be said to have revolutionized the dyer's art. At the present time coal tar dyes are used to color wool, cotton, silk, soaps, inks, leather goods, confectionery, paper, and other substances.

Aniline when pure is somewhat heavier than water. It has a vinous smell and a burning taste. Aniline is a poison, so acting upon the blood as to destroy the red corpuscles. The pure food laws of many states forbid the sale of candy and articles of diet colored with aniline. The Germans prepare aniline so inexpensively that they have a monopoly of the world's market. See DYESTUFFS.

Animal, ordinarily an organism that grows, lives, and feels. It is difficult to give a definition that will separate all animals from all plants. It is easy to point out the difference between the higher animals and higher plants. The horse and the cow, for instance, are different from the elm and the rose; but it is difficult to distinguish between the lower animals and the lower plants. Scientists have long been in doubt whether to call bacteria plants or animals. It is only of late that the decision has been given that they are plants. Both animals and plants grow, so growth does not help us out. It will hardly do to say that an animal feels and that a plant does not, for certain plants seem to be as sensitive as some animals. The sundew and other insect-catching plants are extremely sensitive. Most animals move about, yet a sponge remains fixed. Some large aquatic plants float about without sending their roots into the soil. Many microscopic plants seem to have power of moving toward food.

At their beginning, then, the animal and vegetable kingdoms seem quite on a level, and are almost indistinguishable; but the animal kingdom, with man at its head, far out-tops the vegetable kingdom. By scientists animals are distinguished from plants principally by the difference in the nature of the food of each. Animals can live on substances not differing much, if at all, from the substances composing their own bodies. They can also use solid food. Plants take their food in the form of gases or fluids only. A certain number of low forms seem to combine the characters of animals and plants, and the classification of these forms can be determined only after a special study of each case.

However much animals may differ among themselves, they are all alike in certain fundamental respects. All animals are composed of a complex living proteid substance, called protoplasm. This living substance may occur naked, or surrounded by a thin membrane; but it is always accompanied by a substance called nuclein, which is found in the nucleus. A bit of protoplasm with a nucleus is called a cell. Neither protoplasm nor nucleus can exist if separated, but each soon dies. Some animals consist of only one cell, while others are built up of a countless number of cells. Not only are all animals alike in that they are composed of protoplasm, but all animals take food which they digest and assimilate. All animals are able to throw off waste matter. All animals grow and reproduce.

But the differences between animals are perhaps more striking than the similarities; and were observed much earlier. Thus it has long been known that birds differ

from fishes and that both differ from frogs and reptiles. It is very easy to see that horses differ from cows, and both from sheep. Since there are millions of differing animals known, they have been separated into types, or classes, for the sake of convenience. All the animals in each type resemble each other in some important respects, and differ from the animals in other types in these respects. Authorities differ in regard to the number of types which exist, but agree in placing the number between nine and twelve. Animals which are made up of only one cell are called *Protozoa,* and constitute Type I. Plant-like, fixed animals, made up of many cells, in the form of a modified vase or cylinder with perforated sides, constitute Type II, and are called *Porifera.* Other types of many-celled animals are the *Coelenterata,* the *Vermes,* the *Molluscoidea,* the *Echinodermata,* the *Annulata,* the *Arthropoda,* the *Mollusca,* and the *Chordata.*

But animals resembling each other sufficiently to be classified together under one type may differ from each other in certain less important respects. Therefore it has been found necessary to divide each type into classes, each class into orders, each order into families, each family into genera, each genus into species. Thus, if the full classification of the domestic cat were to be given, he would be placed under the type *Chordata,* because he agrees with fishes, frogs, reptiles, birds, and mammals in having a notochord in his early developmental stages. He would furthermore be included in the class *Mammalia,* because, like all mammals, the cat possesses mammary or milk glands. He would be placed in the order *Carnivora,* because he is a flesheater; in the family *Felidae,* because he possesses retractile claws, has a short face, and teeth differing from other members of the *Carnivora.* The cat is placed in the genus *Felis,* because he differs in size and color from other *Felidae,* like lions, tigers, and panthers. And lastly, he is placed in a different species from the wild cat, because he has changed in habit, size, and color as a result of domestication. In a tabulated form the classification of the domestic cat would appear as follows:

Kingdom	Animalia
Type	Chordata
Class	Mammalia
Order	Carnivora
Family	Felidae
Genus	Felis
Species	Felis domestica

Every animal is classified according to some such scheme as this.

Animals inhabit the land, the water, or the air. The science which treats of them is called zoölogy.—ELLEN TORELLE.

Anise, a plant of the parsnip family. It is a native of Egypt, but is now cultivated from Spain to Syria, and somewhat in Germany. It is an aromatic annual herb about two feet in height. It bears loose, flat-topped umbels of yellowish white flowers, succeeded by curved, grayish seeds. The latter yield a highly aromatic volatile oil. The seeds are used in medicine and in cooking and to flavor wine. Cummin and caraway belong to the same family and have similar flavoring and medicinal qualities. When the Saviour said, "Woe unto you, Scribes and Pharisees, hypocrites! for ye pay tithe of mint, anise, and cummin, and have omitted the weightier matters of the law," he accused them of attending to petty matters to the neglect of important affairs.

Annam, or **Anam,** an Indo-China protectorate of France. It is not only the chief French holding in that peninsula, but in Asia as well. Annam lies on the east coast of Indo-China, with a frontage of about 800 miles on the South China Sea. It is separated from Siam on the west by the Mekong River. A mountain range extends north and south. Area 39,758 square miles. The population (1920), was 5,371,189.

The inhabitants are chiefly "Anamites," speaking a language closely related to Chinese. The mountains are inhabited by a hill people. The peasants of Annam are chiefly Buddhists. The educated element follows Confucius. There are half a million Catholics. Rice is the food crop. The country produces rice, corn, cinnamon, sugar, tea, coffee, cotton, tobacco, and silk. The Anamese considered themselves natives of

the south of China. Legendary Chinese annals running back, nobody knows how long, but for a couple of thousand years before the Christian Era, speak of the inhabitants of Annam under a native name which signifies "with the big toe."

Speaking historically, about 214 B. C. Annam became a Chinese possession. Independence was secured in 1428, over half a century before the discovery of America by Columbus. In the days of greatest prosperity Annam held Cochin-China and Tonking. About the middle of the nineteenth century France began to interfere in the affairs of Annam on the score of protecting the natives who had been converted to Christianity. After the camel got its nose in, the body followed. Successive treaties were forced upon the rulers until, in 1886, the French government, English fashion, announced that Annam had consented to permanent French protection.

The King of Annam governs, assisted by a Council of Ministers, in accordance with the wishes of the French Government. The capital is Hue, a city of 60,611 people. A French garrison occupies the citadel. The ports of Annam are open to all countries for trade.

Annapolis, the capital of Maryland and the seat of Anne Arundel County. It is situated near the Chesapeake. The city was founded in 1649 by a colony of Puritans from Virginia. The name was changed from Providence to the present name in 1708 in honor of Queen Anne. Annapolis is one of the historic cities of the Union. In the old state house General Washington tendered his resignation as commander-in-chief of the Continental army. A meeting of delegates from five states, known in history as the Annapolis Convention, was held September 11, 1786, to discuss needed changes in the Articles of Confederation. The city has a large business in fruits, berries, vegetables, oysters, and glass. Population, 1920, 11,214. See LAFAYETTE; MARYLAND.

Annapolis Naval Academy, a national academy for the instruction of future naval officers maintained at Annapolis, Maryland. It has training stations at Newport and San Francisco. It was founded in 1845. The students are styled midshipmen. Each senator, representative, and delegate in Congress is allowed five appointments, and Porto Rico five, who must be natives. Each year the President appoints fifteen men from the United States at large and two from the District of Columbia. The navy is allowed 100 selected from enlisted men.

Candidates must be actual residents of the districts from which they are appointed; they must be between sixteen and twenty years of age, unmarried, and not weigh less than 105 pounds at sixteen years with an increase of five pounds for each additional year. They are rigidly examined in English, Geography, History, and Mathematics. The course of training is six years—four years at the Academy and two years at sea—after which the final graduation takes place. Each midshipman is allowed $750 a year and traveling expenses. On admission to the academy he must sign an agreement to serve the United States Navy during the pleasure of the President of the United States.

There are more than 2,000 cadets and scores of instructors. The pay of graduates who have been commissioned and are on the active list is as follows:

Admiral	$10,000
Vice-Admiral	9,000
Rear-Admiral	6,000 to 8,000
Captain	4,600
Commander	4,100
Lieut.-Commander	3,840
Lieutenant	3,120
Lieutenant (Junior)	2,600
Ensign	2,120

Ann Arbor, a thriving inland city of southern Michigan. Population, 1920, 19,500. It is the shipping point of a large agricultural and fruit growing region, and has prosperous manufactures of implements, furniture, wagons, pumps, and engines. The city is noted chiefly, however, as the seat of the University of Michigan, the oldest of a large group of state universities in the North Central States. It was established in 1837, the year in which the state was admitted to the Union. The intelligence, liberality, and scholarship that have characterized

the University of Michigan have resulted in the development of one of the great universities of the world. It possesses a spacious campus and capacious buildings. There are various colleges, large faculties, including many professors of acknowledged scholarship, leaders in their respective departments of thought. There are over five thousand students. Public confidence in institutions of higher education supported by the state was won by the success of this state university. As a consequence the state university idea has been intrenched in the West as a part of a public school system in practically all the states, connecting at every step with the district school. See UNIVERSITY; MICHIGAN.

Anne, Queen of Great Britain and Ireland (1665-1714). She was born in London, the daughter of the Duke of York, afterward James II. Anne was the last British sovereign of the Stuart line. In 1683, she was married to Prince George of Denmark. He knew little about the affairs of state, and never troubled himself to learn more. Anne had borne 17 children, but only one of them survived infancy. This one died in 1700, at the age of 11. She had no direct heir, therefore, when she ascended the throne in 1702. Anne was neither brilliant nor firm, being dominated throughout her reign by one person or another. First, and chiefly, she was influenced by the playfellow of her youth, Lady Churchill, who afterward became the Duchess of Marlborough; and later by Mrs. Masham, a relative of the Duchess, and the Queen's favorite. Anne was desirous of securing to her brother the right of succession. Her ministers were not unfavorable to this plan, but they were constantly quarreling among themselves over other matters. A dispute occurred in the Queen's presence between the Earl of Oxford, one of her ministers, and Mrs. Masham. The dispute was carried on for hours, and ended only when Anne demanded Oxford's immediate resignation. This affair was soon followed by the stroke of apoplexy of which the Queen died. The chief events of her reign were the union of England and Scotland, and the War of the Spanish Succession. Although Anne gave little or no active encouragement to the arts or sciences, her reign is sometimes called the Augustan Age; and among the illustrious men of the period were Swift, Pope and Addison.

Annealing, the process of softening and toughening metals so that they are less brittle and more readily rolled into sheets or drawn into wires. Annealing is the opposite of tempering. Copper may be annealed by being plunged into cold water when at a white heat. Zinc heats and grows tough and flexible by the very process of being drawn into wire. Most metals are made flexible and tough by heating them until they are soft, and then allowing them to cool slowly, the more slowly the better. A blacksmith desiring to anneal a piece of iron heats it to a white heat, and then thrusts it into a heap of ashes, which conduct heat poorly, to cool off slowly. On the contrary a sudden plunge into a tub of water hardens or tempers a heated plowshare. Skill is required by the blacksmith to sharpen a plowshare and yet avoid the extremes of brittleness and softness. Wrought iron is, of course, annealed iron.

Anniston, Ala., has a delightful location in the foothills of the Blue Ridge Mountains, 63 miles east of Birmingham. It is the county seat of Calhoun Co. It was founded in 1873 by the Woodstock Iron Company, but was not opened to settlement by the public until ten years later. The most important industry is the production of cast-iron pipe. It has also blast furnaces, foundries and machine shops. It contains the Alabama Presbyterian College, Noble Institute, and the Barber Memorial Seminary, an industrial school for colored girls. Population, in 1920, 17,734.

Annotto, or **Arnatto,** a coloring material. It is obtained from the pulp of the berries of the arnatto. The latter is a small tree growing in tropical America. The West Indies are the chief source of supply. The Indians rub annotto on their bodies as a defense against mosquitoes. Annotto is brought to market in brown cakes. It is the accepted coloring used by dairymen to give butter and cheese a rich yellow, palatable appearance. An-

notto is used as a dye for silks, woolens, and cotton goods. It may be employed to deepen the yellow of lacquer and varnishes. It is a remedy, it is claimed, in case of fever.

Annual. See HERB.

Annuity, a sum payable annually for a term of years, or for life, or even forever. A system of life annuities grew up in England in connection with the system of entail according to which the family estate is inherited usually by the oldest son. He was charged with paying a fixed sum annually to the other heirs during their natural lives. In this way the title and the estate not infrequently passed to one son, while the income, owing to falling rents, went to the other heirs. Family pride and public sentiment combine to require the holder of the estate and the family title to settle an annuity for life on needy and dependent relatives.

During the past fifty years the payment of annuities has been taken up on both sides of the Atlantic by corporations, chiefly in connection with life insurance. Policies of many kinds are written. In return for a sum paid in hand the company undertakes to return a fixed amount each year of the purchaser's life, or the policy may be drawn in favor of a relative, as a parent, wife, or child. A favorite form of annuity is a joint annuity, payable so long as either husband or wife may live. Instead of a lump sum, payment is not infrequently made for a series of years, as ten or twenty, at the end of which return payment in the form of an annuity begins.

Annuities are not altogether a modern affair. Traces of the system may be found in the records of Babylon and other oriental centers of commerce. Roman laws prescribed suitable regulations for the payment of annuities. In medieval times speculation sometimes took the form of purchasing annuities based on the lives of persons in whose case longevity was to be expected. The English government sold annuities in 1808-1828, thus funding a large part of the public debt, but lost money by selling too cheaply.

A desire to speculate instead of buying annuities and opportunity for profit through investment has retarded the growth of annuity companies in this country, but as the country grows older and confidence in companies becomes established, this form of investment may become more popular as a means of making provision for old age.

In selling annuities no health examination is required, as the poorer the health of the applicant, the more desirable the sale. In return for a lump sum, say $1,000, the older the applicant the larger the annuity that may be sold safely. An epidemic is disastrous to a life insurance company, but a source of profit to an annuity company. Long lives are profitable to life insurance and a source of loss to annuity companies.

In return for a payment of $1,000 the leading companies agree to pay a person of forty years of age an annuity of $52.75; 45, $58.10; 50, $64.70; 55, $73.50; 60, $86.20; 65, $100; 70, $123.45; 75, $149.95; 80, $180.15.

See INSURANCE; TONTINE.

Annunzio, Gabriele D' (1864-), an Italian novelist, poet, dramatist and soldier, was born at Francavilla, an Adriatic fishing village. He began to contribute stories to Italian papers when only 15 years of age. Early success fanned his desire; he worked unstintingly to master the Italian language and to perfect his style, and succeeded so well that at the opening of the 20th century he held first place in Italian letters. Some of his works are frank to the point of impropriety, and his subjective manner detracts from the realism of some of his characters; yet in all his work there is the undoubted sign of the original genius. He is a master word painter capable of sustained flights of imagination.

D'Annunzio volunteered as a private in the aviation section of the Italian army at the outbreak of the World War; was made a lieutenant in 1915; received the Croix de Guerre of France; and by word and act did much to stimulate the Italian national spirit. When, in 1919, controversy arose between Italy and Jugo-Slavia over Fiume, D'Annunzio resigned his rank of

lieutenant-colonel in the army, and in September, 1919, took possession of Fiume with a small army of his own, and defied the government to dispossess him. His action was caused by the proposed rehabilitation of Fiume as a separate state with territorial contiguity to Italy. D'Annunzio capitulated in December, 1920, and disbanded his army of about 6,000. Some actual fighting occurred between D'Annunzio's followers and the Italian regulars. About 35 men were killed and 170 wounded.

Anselm (1033-1109), a noted medieval scholar. He was born at Aosta, in Italian Piedmont. He was educated at the convent of Bec in Normandy. Here he became prior, and in 1078 he was made abbot. Under William II and Henry I of England, from 1093 to 1109, he was Archbishop of Canterbury. Anselm adhered stanchly to the principles of Pope Gregory VII. He took for his motto "*Credo ut intelligam,*"—"I believe in order that I may know." He taught that the believer should advance from direct and simple faith to whatever degree of scientific knowledge may be attainable, but always with faith unshaken. Doctrines taught by the church were not to be questioned. The student might investigate only to learn why the doctrines were true. Anselm's position is thus stated by himself. His words are translated, of course, from the original Latin into English: "Whether that is true which the universal Church believes with the heart and confesses with the mouth, no Christian can be permitted to question; but, while holding fast to it without doubting, and loving and living for this faith, he may and should search in humility for the grounds of this truth. If he is able to add to his faith intelligence, let him thank God; if not, let him not turn against his faith, but bow his head and worship." In the history of philosophy Anselm is known as one of the great school men. See ABELARD; SCHOLASTICISM.

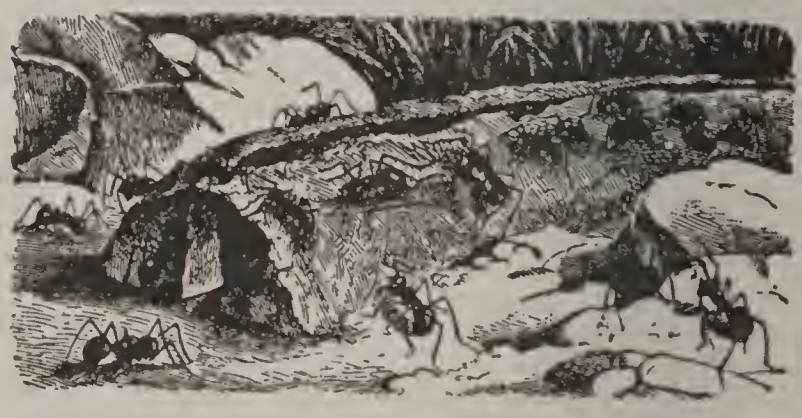
Ansgar, ăns'gär (801-865), a Frankish missionary to Denmark, Sweden and northern Germany. He was born near Amiens, France. He received his education at the monastery of Amiens and at another in Korvei, Westphalia. His first attempt to introduce Christianity to the northern nations was made at Schleswig, where he met with marked success, although he was severely persecuted. He extended his work to Denmark and Sweden, and won the name by which he is often known, the "Apostle of the North." He has been canonized by the Roman Catholic Church.

Ansonia, Conn., a manufacturing city on the Naugatuck River, 12 miles west of New Haven. Notable among its products are heavy machinery, wire goods, electrical appliances and brass ware. One of the most prominent buildings is the Anson G. Phelps public library, a memorial to the founder of the city. Its government consists of a mayor and a municipal council. It was settled in 1840, and chartered as a city in 1893. Population, 1920, 17,643.

Ant, a family of insects allied to bees and wasps. Ants are not mistaken readily for other insects; but scientists rely on a lens-shaped scale or segment to be found at the waist or peduncle of the true ant. Ants are social, living in communities. The males and females are winged. The workers are undeveloped females. They are wingless. The reader is referred to the article on the BEE for comparative information. The ant queen is not jealous. Several may live in the same community, hence no regular swarming takes place. In the season of haying the males and females of many thousand communities come out and fly together, giving the impression that flying ants are a species by themselves. After the pairing season is over, they all fall to the earth. The males die and the females drop their wings and seek entrance to ant hills, where they are welcomed by the workers, or else they start new nests. The eggs of the ant are so small that they can scarcely be seen with the naked eye. The queens drop them carelessly in the runways. The eggs are seized upon by the workers, and shifted about to the driest and warmest parts of the nest. The tiny, white, footless larvae are fed usually by the workers with rich honeydew. The "ants' eggs," which the excited workers may be seen lugging away on the dis-

A colony of army ants on the march.

Nest of the woolly ant. Eggs are stored in the lower cell; larvae being fed in the upper.



Covered passageway in process of construction.

Storehouse of the honey ant.

Visiting ants on the march in West Indies.

Nests and fields of the agricultural ant of Texas.

ANTS.

turbance of their nest, are not eggs but are cocoons or pupae; that is to say, ants in the third stage about to burst the white membrane and come out fully developed.

There are many species of ants. The common, small brown ant that throws up a ring of particles of earth about its burrow is quite a remarkable ant in its way. Ants live usually on flesh or vegetable food and many species, if not all, are fond of flower sweets; but this particular ant makes a regular custom of following plant lice, or aphids, for the sake of the honeydew or sweet juice which these insects give out from their bodies. This ant even cares for the eggs of the aphid over winter, and apparently herds the adult aphids. An ant approaches an aphid, fondles it affectionately with its antennae, and, when the pleased animal gives off honeydew through the tubercles of its body, the ant proceeds to suck it up greedily. Ants found running up and down the stems of weeds, cornstalks, house plants, and trunks of trees or garden vegetables, are, in all probability, on the way to or from their peculiar "milk cows."

The carpenter ant is a large, black ant found in logs and half rotten timbers, in which it cuts extensive galleries. The queen goes off into a cell alone and rears her young, feeding them on food stored in her body.

The honey ant community includes peculiar individuals that stay in chambers and receive the honey collected by their associates until they grow to enormous size. In time of scarcity these vat-like ants regurgitate this honey for the benefit of their now hungry fellows.

The slave-holding ant has a rusty red head and foreparts, with brownish legs and abdomen. It makes its nest under flat stones and logs. It has a curious habit of making slaves, not unlike that practiced by ancient nations. Scouts are sent out to locate the nest of a colony of independent slave ants, a darker red-legged ant that prefers to live alone and unmolested. When the scouts have reported, the slave makers sally out in full and orderly array to storm the nest of their neighbors. The adult ants defend themselves fiercely, for if overcome, they are bitten to death. Their larvae and pupae, maggots and cocoons, are taken home by the conquerors and matured into slaves.

One of our common ants is the mound builder that constructs mounds of sticks, straw, and dirt. These ants have commodious underground quarters. They construct pathways leading in all directions along which they tug, carry, and push seeds, insects, and leaves many times their own weight.

The agricultural ant of Texas establishes paths leading in every direction from the home. It destroys all vegetation near the nest, with the exception of certain seed-bearing grass. This it cuts down when ripe, carrying the seed into its burrows for winter food.

The so-called leaf-cutting ant is an agricultural pest in Central America. An invasion of these ants is as much to be feared in a lemon or orange grove as a flight of Rocky Mountain locusts in a wheat field. Instead of bloom, fragrance, and promise of fruit, in a few days, or even hours, not a vestige of leaf or bud is to be seen.

The telegraph poles of the Panama Railway are of iron. The army ants of that region destroy a cedar pole over night. Du Chaillu, the African traveler, describes a column of army ants that occupied twelve hours in passing before him. Wild animals flee before them. They pick the bones of the largest animal in a few hours.

It has been thought that ants communicate ideas by means of their antennae. When one ant meets another, they cross antennae, apparently by way of giving information. At all events a messenger has some means of throwing a camp into a high state of excitement.

The ant has long had the respect of naturalists and philosophers and has an enviable place in literature, well summarized by Solomon, "Go to the ant, thou sluggard; consider her ways and be wise."

See TERMITES; BEE; WASP; ANTEATER; APHIDS.

Antarctic Continent, a term given to a mass of land thought to surround the south pole. From whatever direction

ships approach the south pole, they encounter floes of pack ice and are stopped finally by ice-capped land. Glaciers from the interior glide into the sea a few inches daily, and break off into icebergs that float about, rendering it impossible at times to get near the coast. In 1842 a navigator by the name of Ross sailed for about 300 miles along the face of an ice wall so high and steep that a landing was impossible. Some of the icebergs that get afloat from such a wall form ice islands many miles in diameter. From certain directions ships are able frequently to sail within 12 degrees of the pole.

In October, 1908, Lieutenant Ernest H. Shackleton of the British navy undertook a sledge journey into this region. Instead of a dog team, ponies were taken, but it was necessary to sacrifice them all for food. On January 9, 1909, he reached latitude 88° 23′, longitude 162° east. He hoisted the Union Jack and left it flying. Lieutenant Shackleton reports a high plateau from 10,000 to 11,000 feet above the sea. It is scoured by enormous glaciers. One glacier 40 miles broad he traced for 120 miles. He saw no less than 8 distinct mountain ranges, and counted over 100 mountains. Lieutenant Shackleton was within 111 miles of the south pole. He was on the continent 126 days and traveled 1,708 miles. He brought back a large collection of geological specimens and many photographs.

On December, 14, 1911, Roald Amundson who had made several attempts to reach the North Pole, reached the South Pole. This was only a short time before Captain Scott succeeded in reaching the coveted goal on January 18, 1912. On the return trip Scott's expedition was halted by a blizzard and perished. Consult the biographies of these men.

The continent is evidently from 1,000 to 2,000 miles in diameter. Various parts of the coast are called Victoria Land, Wilkes Land, Enderby Land, King Edward VII Land, Kaiser William Land, Coats Land, etc. The bottom of the sea is strewn with gravel, blocks of granite, sandstone, limestone, jasper, and other rocks, carried outward by the glaciers and dropped by melting icebergs, indicating genuine continental land. The interior of the ice field has been little explored. Amundsen reports that the region immediately about the pole is a vast plain and reasonably level. It is a region of heavy snows that pile up and up, but never melt, except as they creep slowly away on their journey of hundreds of years to the sea. The intense cold of the region is interrupted by a number of active volcanos. Mt. Erebus is 15,000 feet high. The eruptions throw a weird and spectral glare into the darkness of the winter-long antarctic night.

The Antarctic shores are not without fishes. Wherever an islet or point of land is free from ice, insects, mosses, lichens, and grasses are found. Penguins nest on these flats in enormous numbers. The broad wings and the cries of the albatross, the tern, and the gull relieve the dreariness a little. Whales, grampuses, and dolphins are found in Antarctic waters. No less than thirteen species of sea lions and fur seals climb ashore to rear their young; but, properly speaking, the region has no land animals such as the arctic fox and the ptarmigan, found in corresponding latitudes of the north. Save by an occasional scientific expedition and the ships of sealers and whalers, the solitude of the great ice cap of the south is unbroken by man. It is left to the ceaseless heave and grind and crash of the ice pack that surrounds it like a barrier.

Antarctic Ocean, a name commonly given to the waters that surround the ice-capped south polar regions. While not a naturally defined ocean at all, its northern limit is considered to be the Antarctic Circle. This zone of water contains a great number of islands, and is evidently traversed by ocean currents that carry icebergs into the southern parts of the adjacent oceans.

Anteater, a name given to several quite different animals, but particularly to a sloth-like family of tropical American eaters of ants, sometimes called ant bears. The great anteater is of the size of a badger. Its body is about twelve inches long; its neck and head eleven inches, and its tail sixteen inches. It has an extremely long snout and can extend its tongue nine inches. Indeed its tongue is so long that

it must be doubled up in the mouth when not in use. It resembles a skunk, but its extremely long snout, immense tail, and huge fore claws show that its habits are its own. It is a slow animal. Much of its time is spent in sleeping, with its huge, bushy tail thrown over it for a hairy blanket. It prowls about always on the ground, in the forests of the Amazon. It has no teeth. It gathers ants with its long tongue from an ant hill or the trunk of a tree where they are running. Its front claws are so large that, when not in use for tearing open ant hills, they are doubled backward under the foot, especially in walking. Other smaller species, the size of a cat or less, climb trees and hang from branches by their tails, like monkeys. The young of the various species ride snugly on the mother's back, where they cling to her fur and are sheltered by the long hair of her tail. A somewhat similar animal is known in Africa as the aardvark. See SLOTH; ARMADILLO.

Antelope, a group of animals placed by scientists midway between cattle and goats. The antelope resembles the deer in habits and appearance, but is entirely distinct. The so-called prong-horned antelope of the West belongs to another family. Antelopes proper are found only in the Old World. By far the greater number of one hundred species belong to Africa. The gazelle of Syria is noted for grace and the beauty of its eye. The pigmy antelope of African forests is only thirteen inches in height. It is the smallest known cudchewer. The eland of South Africa ranks with cattle in weight. The Dutch colonists of Cape Colony and South Africa found antelopes so numerous and tame that they could be depended upon for meat as though they were domestic cattle; but several species have been exterminated, and others bid fair to become extinct. Both sexes have horns which are retained like those of domestic cattle. These, and their fleetness of foot, are their only protection against beasts of prey. They are the fleetest of quadrupeds. The lion lives chiefly on antelopes. Dr. Livingstone's *Travels* give many authentic anecdotes of antelopes and their speed, and ofttimes successful defense against the lion and other enemies. See GAZELLE; PRONGHORN; HORN; CHAMOIS; GNU; UGANDA.

Antennae, a pair of feeling organs peculiar to insects, crayfish, and closely related animals. They are usually thread-like or club-shaped, and are inserted between, or in front of, the eyes by a ball and socket joint. They are moved by small muscles at the base within the head. The antennae of some insects are simple; others are branched; some are straight; some curved. Insects use their antennae for many purposes. A nerve from the brain extends through the antenna to its tip, making this organ as sensitive as the eye, ear, or the tongue of ordinary animals. Ants seem to communicate with each other by rubbing their antennae together. The honey bee works in the dark, making its cells of exactly the right size and shape, its only guide being measurements made by the antennae, just as a sculptor molds his model with the aid of his finger tips. It is now well understood that many insects not only feel, but hear and smell, and are sensitive to light by means of these wonderful organs. If a bee loses a leg or a wing, it doesn't seem particularly distressed; but when its antennae are cut off, it is dazed and stupefied as though a part of its brain had been removed. It has been found that if an eye of a crayfish is cut off from its stalk, an antenna frequently develops in its place. If an antenna is removed from the head of a crayfish, an antenna, not an eye, regenerates in place of the old one. See INSECTS.

Anthology, a Greek term meaning a collection of flowers, a garland. Hence a collection of short poems or beautiful passages. Compiling an anthology has been a favorite task since the first anthology was made by Meleager, a Syrian, 90 B. C. One of the latest and most meritorious, entitled *A Victorian Anthology,* was compiled by E. C. Stedman. Emerson also made a collection of choice poems, to which he gave the name *Parnassus.*

Anthon, Charles (1797-1867), an American educator. He was a native of New York, and a graduate of Columbia

College. He studied for the law, and was admitted to the bar, but he preferred to become an instructor in Columbia. He edited an edition of Horace, 1830. Some fifty volumes, mainly Greek and Latin classics for school and college use, followed in due succession. Dr. Anthon was a kindly man of vast erudition, but it was felt that his notes were too copious and left little for the student to do. Hence the expression, "with his Anthon," is akin, in college phrase, to the aid of a "pony" or translation.

Anthony, Susan Brownell (1820-1906), an American reformer. She was born at South Adams, Massachusetts, of Quaker ancestry. She was a teacher, an organizer of temperance societies, an anti-slavery leader, and an ardent advocate of female suffrage. She was associated with Garrison, Douglass, and other anti-slavery workers. Her most intimate friend was Elizabeth Cady Stanton. Lucretia Mott, Lucy Stone, and Frances E. Willard were also co-workers. In 1853 Miss Anthony made her first public speech. The occasion was a meeting of the New York Educational Convention. Women were permitted membership and were, it may be presumed, allowed to pay their annual dues, but they were not expected to be heard. When Miss Anthony rose to address the chair, the convention was thunderstruck. The men wrangled half an hour over the proposed innovation before they instructed the presiding officer to waive the point of order and grant Miss Anthony the privilege of speaking. When Miss Anthony began her work, there were practically no occupations for women except domestic service, sewing, and teaching young children. High schools were not open to girls. A woman's property belonged to her husband. She could not even collect her own wages. One of Miss Anthony's great victories was a law passed by the legislature of New York in 1860, giving a woman the right to hold her own property and to act as guardian to her children. One who wrote her life says, "Every girl who now enjoys a college education; every woman who earns a living in any profession or trade; every wife who is protected in the ownership of property; every mother who has an equal right with the father to the custody and control of her children; every woman who belongs to a club and works for individual and civic improvement, owes these sacred privileges to Susan B. Anthony above all others." Miss Anthony was for many years the president of the National American Woman Suffrage Association. She was an able platform speaker, a cogent writer, a courageous, persistent woman. With it all she was known among her associates as a sympathetic friend and an excellent cook and housewife. Whatever fanciful notions might possess others, she never forgot that the world is full of hard work and of every day prosaic duties. See HOWE, JULIA WARD; WILLARD, FRANCES.

Anthracite. See COAL.

Anthrax, an infectious disease prevalent chiefly among cattle, sheep, and other grazing animals. The horse and deer are also attacked, as well as the goat, the hog, and the guinea pig. It is held that all warm blooded animals, whether flesh-eaters, or herb-eaters, are subject to the disease. Man is occasionally affected, and it is held by some authorities that birds are immune.

The disease is of an epizoic nature. It is also known as bloody murrain and wool sorter's disease. It is due to one of the rod-shaped bacteria. The germ is one of the largest. It has been known since 1849, and was one of the forms studied by Dr. Koch in his famous investigation of bacteria as the cause of contagious disease. It is very difficult to kill the germs either by drying or by boiling. Domestic animals have been known to acquire anthrax by grazing above the spots where animals dying of the disease had been buried three years before.

The germ multiplies very rapidly, especially in the blood, where it produces the poisonous substances causing death. The germs are commonly taken in with food or water though they may gain entrance to the system through wounds. When in the form of spores they resist heat, cold and most disinfectants, and may live in the soil for years. It is found that lowlands,

especially those having a muck soil, are more likely to be infected than higher lands with a dry soil, and cattle and sheep pastured on lowlands are more likely to contract anthrax than those in different pastures. Fields containing stagnant pools are especially infectious.

The symptoms of the disease vary with the animals and the type of disease. In its most acute form the animal usually appears to be perfectly well at first, though it may have a high temperature. This condition is followed by tremors, grinding of the teeth and standing with the head down. The animal soon becomes very weak and leans against a support or lies down. The disease progresses more rapidly when the germs gain entrance through food than when they enter through wounds, because in the former case the vital organs are immediately affected. In violent cases the animal dies within one or two days. In milder cases it may survive for several days.

When appearing in man, anthrax is generally known as a wool sorters disease because it is contracted by those who are engaged in handling wool or tanning leather. The wool or the hides, as the case may be, are infected and the infection enters the system through scratches or other cuts. In man, anthrax is recognized by the formation of large fistules or carbuncles. The disease is seldom fatal but when suspected a physician should be consulted at once.

In domestic animals medical treatment is of little avail. The surest methods are those of prevention. First and most effective is vaccination with a vaccine which renders the animal immune. This vaccine, however, is a powerful and dangerous remedy unless properly administered, and it should always be used by an experienced veterinary surgeon. Exclusion of the diseased animal as soon as suspected is imperative, and the carcass of a dead animal should be burned or deeply buried as soon as possible.

Anthropology. See RACES OF MEN.

Anti-Cigarette League. The beginning of this organization was the founding of a local league in Chicago in 1899 by Miss Lucy Page Gaston. Her work among the boys of Chicago bore such good results that she was asked by business men to undertake similar work of national scope. The League is supported by a membership fee of ten cents each and voluntary contributions. Women and girls are admitted to membership as auxiliary members and urged to lend their influence to the cause. In connection with the activities of the league free clinics exist, in order that those who wish to give up the cigarette habit may find aid. Medical treatment and certain diets assist in the cure.

Two kinds of treatment are suggested by the League: (a) Six ounces of a solution (one-fourth of one per cent) of nitrate of silver. This is used as a mouth wash after each meal for one week, if needed. It is not to be swallowed. (b) Gentian root (not powder) chewed between meals. This is a tonic and an aid to digestion. To this medical treatment is added a diet which consists chiefly of fruits, cereals and milk.

The progress of this movement was checked during the fight for prohibition, but with the election of a dry Congress in 1922, and the activity of government agents, the movement has attained a new impetus and something over half a million dollars have been pledged to the cause. The League is working for a membership of ten million by 1925, and this membership will include total abstainers from liquor as well as cigars and tobacco. The organization publishes a small magazine *Clean Life,* issued monthly.

Anticosti, a rocky island in the Gulf of St. Lawrence, belonging to the province of Quebec. It is a favorite resort for bear and other wild animals, and for many years was held under lease by M. Menier, the famous French chocolate manufacturer, who made it a game preserve and attempted to develop its resources. Agriculture is almost impossible, for the interior is either rocky or swampy, and even where the soil is favorable mid-summer frosts kill many crops. Geologically the island is interesting as being one of the best examples of the transition between the Ordovician and the Silurian systems. Its area

is 3,147 square miles. The population, for the greater part lighthouse-keepers and their families, is about 250. It is almost destitute of harbors, and the shores are mountainous and beset with shoals.

Anti-Federalists, a political party in the United States, which was in opposition to the so-called Federalists. Theoretically, they believed in a National form of government. The party was formed when the Constitution of the United States was an issue. Those in favor of the Constitution adopted the name of Federalists. These had the advantage of having a positive programme, and had gained the first two points in the conflict when the national constitution was adopted, and they committed the government to such extensive powers as the creating of a national bank. The Anti-Federalists, therefore, were only a political party in opposition to the party in power. When the Federalists, however, appeared to encroach upon the liberty of the jurisdiction of the states, and even personal liberty, as voiced in the Alien and Sedition Acts, the opposition of the Anti-Federalists became acute, and they voiced their disapproval in the so-called Virginia and Kentucky Resolutions. Jefferson was their leader, and under his guidance the Anti-Federalists triumphed in the election of 1800. Soon after this, however, the leaders began to abandon the party's insistence upon the strict interpretation of the Constitution and its narrow limitation of the powers of the government. The first step in this direction was the purchase of Louisiana. When the Federalist party went out of existence, the Anti-Federalists retained the chief principles of the former. The party afterwards was known as the Republican party, then Democratic-Republican, and finally as the Democratic party. The name Anti-Federalist is commonly applied to the party in power up to the Adams administration, but the name should be limited to the campaign for the adoption of the Constitution.

Antidote. See POISON.

Antietam, ăn-tē′tam, a small creek in Maryland fifty miles west of Washington. It flows through a wooded ravine into the Potomac a few miles below Harper's Ferry. It is noted as the scene of one of the decisive battles of the Civil War. General Lee's army, engaged in his first invasion of the North, was here turned back in a bloody battle, September 16 and 17, 1862. The Union forces were commanded by Generals McClellan, "Fighting Joe" Hooker, Sumner, Meade, Burnside, and Fitz John Porter. Noted commanders of the Confederate side were Lee, "Stonewall" Jackson, Stuart, Pickett, Hood, and Hill. Not less than 100,000 men were engaged. The carnage was terrific. Entire regiments were almost wiped out. Missing, wounded, and killed outright, the loss of both sides taken together was not far from 25,000 men.

Antigone, ăn-tĭg′o-ne, a famous character in the legendary history of Greece. She is a notable example of filial love and sisterly devotion. She has been compared to Cordelia in Shakespeare's *King Lear.* Antigone is the subject of two of the tragedies of Sophocles. Her father, Oedipus, the victim of a direful fate, is driven from his kingdom, and, shunned by everyone but his daughter, is doomed to unhappy wanderings. At his death Antigone mourns:

> Alas! I only wished I might have died
> With my poor father; wherefore should I ask
> For longer life?
> Oh, I was fond of misery with him;
> E'en what was most unlovely grew beloved
> When he was with me.

Antilles, ăn-tĭl′lēz, the curved chain of large and small islands forming the outer boundary of the Caribbean Sea. It sweeps from Cuba around to the coast of Venezuela, including practically the whole of the West Indies except the Bahamas. Cuba, Jamaica, Porto Rico, and Haiti are called the Greater Antilles. They appear to consist largely of primitive rock. The Lesser Antilles are largely of coral and volcanic formation. They include a large number of groups. Sailors call the northern part of the chain the Leeward Islands; the southern part, the Windward Islands. The plants, animals, and industries resemble those of Central America. Farther information may be found under WEST INDIES and the names of the more important islands.

An′timony, a brilliant, bluish-white, brittle, crystalline metal, found in nature in combination with sulphur. Ores of antimony are found in California and Nevada, Mexico, New Brunswick, Bavaria, Italy, Spain, Portugal, Corsica, Sardinia, Asia Minor, Japan, Borneo, Cape Colony, Australia, and New Zealand. Antimony is obtained by melting the ores with iron, in which case the sulphur deserts the antimony for the iron, leaving the antimony free. Only about 4,000 tons a year are required for the arts. Its principal use is in alloys, particularly with lead and tin, to form type metal, to which antimony gives the required degree of hardness. Antimony is used in medicine. The alchemists called it regulus, from the readiness with which it acted on gold, the royal metal. Ground antimony is much used by the women of Turkish harems for painting the eyebrows and eyelashes, and to give luster to the eyes. See ALLOY; POISON.

Antioch, ăn′tĭ-ŏk, once a name ranking with Rome, Athens, Alexandria, and Babylon; now an obscure city of Syria. It is situated on the Orontes, fifteen miles from the Mediterranean. It was founded in the midst of a beautiful fertile plain, 300 B. C. When Alexander's kingdom broke into fragments, the capital of the eastern or Babylonian kingdom was located finally at Antioch. The city was noted for the splendor and magnificence of its public buildings. A straight street four miles in length led eastward through its center. A covered portico, supported by a double row of marble pillars, rose along each side. The river Orontes and a dark cypress grove sacred to Daphne added to the beauty of the vicinity. "Antioch, the Beautiful," "The Crown of the East," were favorite names. Thirteen successive monarchs were proud to be called Antiochus. A royal palace, senate house, gilded temple of Jupiter, theater, amphitheater, aqueduct, public gardens, and baths were erected in a style exhibiting the combined influence of Grecian art, eastern luxury, and unlimited wealth. Situated only fifteen miles from a safe seaport at the mouth of the little river, favored by the government, Antioch became the western terminus of the eastern caravan trade.

The city has had a varied history. Under the Roman Empire it was a city of importance, and became a center of the Christian faith. Antioch is referred to in Acts xi: 26: "And when he had found him, he brought him unto Antioch. And it came to pass, that a whole year they assembled themselves with the church, and taught much people. And the disciples were called Christians first in Antioch." Many Christian churches were erected. Ten general councils of the church were held here.

Antioch passed successively into the hands of the Saracens, the Greek emperors, the Crusaders, the Mamelukes of Egypt, and finally in 1516, into the hands of the Turks. Earthquakes and hovel builders have left little of the old splendor standing. The present city is a squalid place of 20,000 people. There is some export trade in silks, leather, carpets, goat's wool, and beeswax; but, with a better day dawning on the Orient, Antioch may again become a city of importance.

Antiope. See FARNESE BULL.

Antipodes, ăn-tĭp′o-dēz (Greek, against feet), people who live on diametrically opposite portions of the earth's surface with their feet turned toward each other. The term is applied also to localities. Thus the north pole and the south pole are antipodes. Any two points on the equator, 180° apart, are antipodal. When noon in one place, it is necessarily midnight at the other, and if the places be not situated on the equator, it is midsummer at the one, when midwinter at the other. Antipodes Island is an uninhabited island about 460 miles southeast of New Zealand, so called from being nearly opposite Greenwich, England.

Antiquary, The, a novel by Sir Walter Scott, published in 1816. It was intended, the author tells us, to illustrate the manners of Scotland during the last ten years of the eighteenth century. Jonathan Oldbuck, the Antiquary, is the hero of the story. Lovel, Isabel Wardour, the Earl of Glenallan, and Eveline Neville are other prominent characters. See SCOTT.

Antisep'tic (anti-poisonous), a term applied to any process or substance that arrests decay. Inasmuch as decay, rot, putrefaction, fermenting, souring, "spoiling," and maturation are the results usually of low forms of bacterial or fungous life, any process or substance that destroys or checks the growth of mold, yeast, rust, smut, mildew, or bacteria is antiseptic. In a large sense the processes of heating, boiling, burning, smoking, pickling, canning, preserving, freezing, and disinfecting are antiseptic. Of substances, sugar, most oils, alcohol, vinegar, formalin, salt, alum, niter, creosote, tar, paint, in short, all preservatives, are antiseptic. In a narrower sense the term is one used in surgery to denote means employed to prevent bacteria from lodging and growing in wounds or incisions made by the knife. In addition to the sterilization of instruments, of bandages, lint, and other appliances, carbolic acid and other dressings are used to prevent the lodgment and growth of bacterial germs. See BACTERIUM; SURGERY; LISTER.

Antitoxin, or **Antitoxine,** ăn-tī-tŏks'ĭn, a word meaning literally "opposed to poison." A toxin or toxine is the poisonous product of disease-producing bacteria. The word antitoxin is used most commonly to designate the serum which is opposed to the poison of diphtheria bacilli, since it is in the cure of diphtheria that an antitoxin has been used chiefly, and with most marked success. The antitoxin for lockjaw, pneumonia, and other diseases is in use, however, and progress is being made constantly in this line of therapeutics. The principle underlying this method of treatment is that in the blood of persons or animals suffering from a bacterial disease a substance is formed by natural processes which has the power to render harmless the toxin or poison produced by the bacteria. If an animal is inoculated with very small but constantly increasing doses of the toxin produced by the diphtheria bacillus the result will be the development of a powerful antitoxin, which, when injected into the blood of human beings suffering from diphtheria, surpasses all other methods for the treatment of this disease.

Ant-Lion, a predatory insect with four gauzy wings, somewhat resembling the dragon fly. The common name arises from the manner in which the young secure food. The larva of an ant-lion is about half an inch long and has a pair of strong curved jaws. It crawls to a dry, sandy spot where insects are likely to run, and flings the sand with its head until it has a circular pit from one to three inches across, with sloping sides of sliding sand. It then buries itself to the eyes in the center of the pit and waits for some hurrying ant to come sliding down the funnel. The ant-lion now bestirs itself and aids the ant in its descent by flinging sand at it, or by stirring the sand below. In this way an apparently helpless "worm" outwits one of the most nimble and intelligent insects. Chambers speaks of a European species that makes a pit thirty inches in diameter. Entomologists report over fifty species from the semi-arid regions of the southwestern United States.

Antoninus. See MARCUS AURELIUS.

Antoni'nus, Wall of, a military defense constructed by the Romans in Britain about 140 A. D. It led from Old Kirkpatrick on the Clyde to the Firth of Forth, a distance of twenty-seven miles. The work was designed to keep out the northern barbarians. It consisted of a ditch about twenty feet deep and forty wide; a breastwork of earth and stones, twenty-four feet thick at the base and about twenty feet high, and a military road following the south side of the wall from Clyde to Forth. The work was protected by a chain of nineteen forts with watch towers at frequent intervals. A force of Roman soldiers kept constant guard. Traces of the wall may still be found. The defense was named for Emperor Antoninus Pius, during whose reign it was constructed. See HADRIAN.

Antonio, an-tō'ni-o, in Shakespeare's *Merchant of Venice,* the wealthy merchant from whom the play takes its name. Although the action seems to hinge upon Antonio, through his relations with Bassanio and Shylock, he is not the hero of the play. Antonio may be regarded as one of Shakespeare's finest characters. His friends speak

of him as "the good Antonio." One says, "A kinder gentleman treads not the earth," and another, "O, that I had a title good enough to keep his name company." Antonio is a name of frequent occurrence in literature. Shakespeare himself used it in several plays. The Venetian merchant, however, is the character whom the name usually brings to mind. See MERCHANT OF VENICE.

Antony, Mark (83-30 B. C.), a Roman soldier. The third of the name, remarkable alike for his ability and his vices. Antony was a personal friend of Julius Caesar and served with him in the Gallic Wars. As is well understood, Caesar kept an eye on public affairs at Rome, whither Antony returned and secured his own election as tribune. When the senate passed an act commanding Caesar to disband his army, Antony and his colleague interposed a veto and disguised as slaves fled for their lives to Caesar. This gave Caesar the desired pretext for crossing the Rubicon and marching on Rome. When later the conspirators assassinated Caesar at the foot of Pompey's Pillar, Mark Antony stirred up the populace against them in a famous oration of which Shakespeare has given us his idea in the play of *Julius Caesar*. With Octavius and Lepidus, Antony formed the triumvirate which pursued Brutus and Cassius to Thessaly, where Antony won the famous battle of Pharsalia. In the subsequent division of the Roman world, in which Lepidus played a small part, Octavius received Rome and the West; Antony, Alexandria and the East.

At Alexandria Antony fell under the influence of Cleopatra, the last of the Ptolemies, and led a life of debauchery and ease. Octavius, not content with Rome, found an easy pretext and quarreled with Antony. The details of the quarrel between them would be tedious; but where one man is ambitious and scheming, while the other is profligate and careless, even though brave, it is not difficult to foresee who is to be the master. Octavius defeated his rival in a naval battle off Actium, and Antony fled to Alexandria in search of Cleopatra. Learning that she had played him false, he fell on his sword and put an end to a brave, generous, profligate, and, on the whole, worthless life. See CLEOPATRA.

Antony and Cleopatra, one of Shakespeare's tragedies. It was written and produced on the stage in 1607. It was printed first in the Folio of 1623. The source of the plot is North's *Plutarch*. In the first three acts Shakespeare followed the historical narrative more closely than in any of his other plays. See SHAKESPEARE.

> In the fourth and fifth acts Shakespeare's method changes, and he expands his material with magnificent freedom. The whole theme is in his hands instinct with a dramatic grandeur which lifts into sublimity even Cleopatra's moral worthlessness and Antony's criminal infatuation. . . . Into the smallest as into the greatest personages Shakespeare breathed all his vitalising fire. The "happy valiancy" of the style, too —to use Coleridge's admirable phrase—sets the tragedy very near the zenith of Shakespeare's achievement, and while differentiating it from *Macbeth, Othello,* and *Lear,* renders it a very formidable rival.—Sidney Lee.

Antwerp, an important commercial city of Belgium. It is situated on the "lazy Scheldt," sixty miles from the North Sea. It is at least a thousand years old. At the time of the discovery of America, Antwerp was the leading commercial city of western Europe, far surpassing London. It has not had fair treatment at the hands of jealous rivals. Just to realize how unfair nations can be, it is well to know that by the Treaty of Westphalia, 1648, it was agreed to forbid merchant ships from entering the Scheldt, nor was Antwerp permitted to engage again in commerce until the French opened the Scheldt in 1794. Napoleon spent $10,000,000 in the construction of docks. He declared Antwerp to be a "loaded pistol which I hold at the throat of England." Antwerp had its full share of the miseries of the warfare which from time to time rolled over the Netherlands. It suffered from the "Spanish Fury" of 1576 and the "French Fury" of 1583, and on October 7, 1914, the "German Fury" began to set a trail of agony by bombarding the city for ten days into a veritable inferno with shells filled with naphtha. King Albert sent a messenger to the German lines with a map of ancient landmarks, begging their safety.

The cathedral is the most noted church edifice in the Low Countries. It is nearly 500 feet long and three-quarters as wide. Its graceful north tower and lofty spires, more than 400 feet high, rising above the unique roof, and beautiful colored windows are battered and torn. Three great masterpieces of Rubens adorn its walls—*The Descent from the Cross, The Elevation of the Cross,* and *The Assumption.*

The modern city of Antwerp was regarded the strongest fortress in the world. $20,000,000 was spent only five years before the war to strengthen it. It was regarded as impregnable; but the huge German guns reduced it to bits, the Belgian guns being too short ranged to reply. For many years before the war the city was the greatest seaport in the world. The population in 1920 was 333,832. See AMSTERDAM; SCHELDT; VANDYKE; RUBENS.

The city was so ancient that its genealogists, with ridiculous gravity, ascended to a period two centuries before the Trojan war, and discovered a giant, rejoicing in the classic name of Antigonus, established on the Scheld. This patriarch exacted one-half the merchandise of all navigators who passed his castle, and was accustomed to amputate and cast into the river the right hands of those who infringed this simple tariff. Thus "Hand-werpen," hand-throwing, became Antwerp, and hence, two hands, in the escutcheon of the city, were ever held up in heraldic attestation of the truth. The giant was, in his turn, thrown into the Scheld by a hero, named Brabo, from whose exploits Brabant derived its name. . . . But for these antiquarian researches, a simpler derivation of the name would seem "an t' werf," "on the wharf." It had now (in the first half of the 16th century) become the principal entrepot and exchange of Europe . . . the commercial capital of the world. . . . Venice, Nuremberg, Augsburg, Bruges, were sinking; but Antwerp, with its deep and convenient river, stretched its arm to the ocean and caught the golden prize as it fell from its sister cities' grasp. . . . No city, except Paris, surpassed it in population, none approached it in commercial splendor.—Motley, *The Rise of the Dutch Republic.*

Aorta, the great artery through which the heart forces blood to the entire body. In the human body it springs from the left ventricle, and arches backward to the spinal column, thence downward. From the very beginning the aorta begins to give off small arteries; first, those that supply the heart itself, then from the top of the arch, the arteries that supply the head, neck, and arms. On its downward descent the aorta gives off branches that supply the body with arterial blood, dividing finally into two large arteries, one for each leg. All arteries save that which carries blood to the lungs for purification are branches of the aorta. The aorta of an average person is about half an inch in diameter. It is considered that all the blood of the body is pumped through the aorta on an average once each twenty-three minutes. See HEART; BLOOD; HARVEY.

Apache, ä-pä′chā, an Indian tribe of Athabascan stock, related to the Navajos. They occupied the mountains of New Mexico and Arizona. In 1853 the United States made the Gadsden Purchase, acquiring 45,000 square miles, now included in the southern part of Arizona and New Mexico. The Apaches at this time were found to be at mortal enmity with the Mexicans. They subsequently gave our government much trouble. From 1857 until 1886, a period of thirty years, the region of the Apaches witnessed one continued series of outbreaks, massacres, and reprisals. They proved themselves to be without exception the most hardy, daring, skillful, relentless, bloodthirsty tribe with which settlers have had to deal. It is estimated that there were 10,000 of them at the beginning of this period. They owned the best of riding ponies, descended from the original Spanish horses introduced into the southwest. Armed at first with bows and arrows, in the use of which they had wonderful skill, and later with firearms obtained from the whites, they were a formidable foe. Mounted on their fleet, wiry steeds, they would emerge from their mountain fastnesses, sweep down upon the settler's cabin, scalp the inmates, apply the torch, and get back to the mountains again before the break of day. Not less than a thousand settlers were killed outright, or carried into captivity and tortured to death by these savages. Small detachments of troops were waylaid. It was impossible for stage coaches to pass through their country without military escort. Many a thrilling tale is told of battles with these

Indians. They were hunted out finally by the United States troops under Generals Crook and Miles. About 5,000 of them are now confined on reservations at Fort Sill, Oklahoma, and elsewhere. Of late the Apaches have found employment as common laborers in building railways and roads and in constructing irrigation works. Contractors claim that they are quite as skillful and as satisfactory as the workmen obtained from Italy, Greece, and Austria. Old Geronimo, the famous chieftain under whom the Apaches made their last stand, was a central figure at the World's Fair held in St. Louis in 1904. He had cunning, cruel features, a low, wrinkled forehead, glittering eyes, and thin, sharp lips. He received so much attention that he became quite irritable. He appeared to lack entirely the native dignity of the Sioux chiefs. He seemed in every way worthy of the nickname, "Red Devil," given him by General Miles. See INDIANS.

Ape, the name formerly applied to any animal of the monkey kind, but now restricted to the man-like tailless apes found in the equatorial forests of the Old World. The chimpanzee, gibbon, gorilla, and orang-utan are apes. The young are more human and less brutal in appearance than older individuals. The adult ape has the same number of teeth as a man, but its canine teeth are very large. Its skull has thick ridges and crests. The forehead is low, and the brain cavity small. The great toe is short and capable of use somewhat like a thumb. The skeleton is stronger than that of man. The legs are shorter than those of man, the arms are longer. The ape can stand upright, but not with ease. All apes are clothed with hair, except on the face and palms. They lack the cheek pouches and tails of monkeys. When walking, they usually double the fingers under, walking on the knuckles instead of the palm. They live mainly on fruit. The "ape" of Barbary is a short-tailed monkey. It is found also on the rock of Gibraltar, being the only representative of the monkey family in Europe. It is a favorite trick animal with the showman. See MONKEY; GORILLA; CHIMPANZEE; ORANG-UTAN.

Apelles, a-pĕl′lēz, a Grecian painter, born 332 B. C. He painted a portrait of Alexander the Great on the walls of the Temple of Diana of Ephesus. A shoemaker, according to one story, found fault with a defect in the sandals of Apelles' *Venus.* The artist accepted the suggestion; but when the unlucky cobbler grew bold and ventured other criticism, Apelles told him sharply that "a shoemaker should stick to his last." He worked with industry and is credited with the proverb, "No day without a line."

Apennines, ăp′-en-nīns. See ITALY.

Aphids, ā′fids, small insects, commonly known as plant lice. An aphid has a pear-shaped, usually green, minute body, seldom one-fourth of an inch in length, with long legs, long feelers, and two pairs of gauzy wings. Plant lice infest vegetation everywhere. Trees, growing field crops, vegetables, wild flowers, and house-plants are full of them. They feed by sucking the juice from tender leaves, buds, and shoots. Some species live on the roots of plants. The grape phylloxera, the pest of the vineyard, is a root aphid that has destroyed thousands of vineyards. There are many species, about two hundred and fifty in the United States. Many leaf blights are due to plant lice. The maple, elm, oak, beech, apple tree, peach tree, cherry tree, cabbage, field corn, and many other plants have plant lice peculiar to each. About the only aid the fruit grower has from nature is the lady-bug, which devours them in immense numbers. An aphid introduced into California from Australia with fruit, becoming a pest, has been held in check by the introduction of a lady-bug from the same locality.

Plant lice are noted for the production of honeydew which exudes from their bodies and falls on twigs, leaves, and the earth. Bees and wasps gather it for the honey that can be made out of it. Many species of ants depend on the aphid for food, which they induce it to yield as a cow yields milk. An aphid infesting the roots of Indian corn, and a brownish ant that lives in the soil, work together in a sort of partnership. The ant cares for the eggs and larvae of the aphid, burrowing

to the roots of the corn and placing the young aphid on a supply of food. The adult lice supply the ants in turn with food. On the leaves of an American ivy vine passing the window by which this article was written, medium-sized, dark-colored ants may be seen fondling aphids with their antennae and gathering honeydew. The ants live under the house, and seem to run up the stem of the ivy daily, confident of finding food. Each stays a half an hour or so, then marches down again with a contented air.

Plant lice multiply rapidly. During the growing season of the year, the female gives birth to countless numbers of young, without their going through the intermediate stage of hatching from an egg. Under favorable circumstances the lice may become so numerous and they suck so much sap, that they retard the growth of a plant or even kill it. Many a conservatory is ruined. Gardeners, fruit growers, and florists get after the lice with soapsuds or spray with a mixture of kerosene and water, well shaken together.

The multiplication or reproduction among the aphids is quite complex, but very interesting, and is now engaging the attention of scientists in Europe and in America. In each colony there are usually both winged and wingless individuals, the number of wingless predominating. Both forms are females, and give birth to living young during the spring and summer. In some species the living young is born inclosed in a soft shell. In the autumn, on the approach of cold weather, a generation is produced, including both males and females. The females of this generation are always wingless, but the males may be either winged or wingless. These sexual forms pair, and the female produces eggs which usually survive the winter, and are therefore termed winter-eggs. In the spring these eggs hatch, producing the winged and wingless females referred to above.

See ANT; INSECTS.

Aphrodite, ăf-rō-dī′tē, in Greek mythology, the goddess of love and marriage. Homer describes her as the daughter of Zeus and Dione. Other authorities state that she sprang from the foam of the sea. The Zephyrs wafted her to the shore of the Isle of Cyprus. Here the Seasons received her, dressed her as suited her beauty, and led her to Olympus. The gods were charmed with the fair goddess, and each one demanded her for a wife. Zeus bestowed her upon Vulcan. She became the mother of Eros or Cupid. Aphrodite was also called Cytherea, because of her worship on the island of Cythera. Aphrodite, or Venus, as the Romans called her, possessed a girdle called the Cestus, which had the power of inspiring love. She was also able to grant beauty and all physical charms to her votaries. The rose, myrtle, poppy, and apple were sacred to Aphrodite, and among animals the dove, swallow, swan, ram, hare, and tortoise. See VENUS.

Apiary, ā′pi-ā-ry, a beehouse or group of beehives. The word is from the Latin *apis*, a bee, which is found also in such words as apiculture, apiarist, etc. A farmer who keeps a few hives of bees to produce honey for his own table seldom uses so pretentious a term as apiary, any more than he would call a half dozen apple trees in his dooryard an orchard. But when bee-keeping becomes more extensive, is followed as a business, the word fills an actual need. See BEE.

Apis, a′pis, the Bull of Memphis, worshiped with great reverence by the ancient Egyptians. The name signifies "the hidden one," and the Sacred Bull was supposed to be the incarnation of Osiris, the god of the under world. The individual animal held to be an Apis was recognized by certain signs. It must be black, have a white triangle on the forehead, a half moon on the breast, and a small hump under the tongue in the shape of a scarabaeus or beetle. This beetle was an emblem of immortality. If such a bull was found, it was brought with great rejoicing to Memphis, tended with care, and, at its death, buried with elaborate ceremonies and at great cost.

Apocalypse, ȧ-pŏc′ȧ-lĭps, a name frequently given to the last book of the New Testament. It is believed to have been written near the close of the first century

by John, "the beloved disciple," after he had been banished to the isle of Patmos by the Roman Domitian. The word apocalypse is from the Greek and signifies "I reveal." The apostle begins his revelation with the words, "I, John, was in the isle that is called Patmos," but it is claimed that the book was written after his return to Ephesus.

Apocrypha, a-pŏk′rĭ-fȧ, a collection of fourteen books originally issued in the authorized version of the Old Testament, but now commonly omitted. These books are: The first and second books of Esdras, Tobit, Judith, a portion of the book of Esther, The Wisdom of Solomon, The Wisdom of Jesus the son of Sirach, Baruch the Prophet, The Song of the Three Children, Susanna and the Elders, Bel and the Dragon, The Prayer of Manasses, the first and second books of the Maccabees. These books are usually recognized by the Church of Rome, but they are excluded by most Protestant churches. The word apocrypha means hidden, or obscure. By the earliest churches it was applied to any professedly sacred or inspired writings whose authorship was unknown, whose meaning was obscure or doubtful, or which were considered objectionable. The fourteen books named above were written in Greek, not in Hebrew. They were never included among the canonical books of the Jewish Bible. They have been the occasion of considerable disputation in the Greek, Roman, and Anglican churches. They are occasionally included, but in a group by themselves, in the King James version of the Scriptures.

Apollo, a-pŏl′lo, in mythology, the son of Zeus and Leto. He was one of the twelve great gods of Greece, the god of the sun, of poetry, prophecy, and of medicine. With his twin sister, Artemis, he was born on the island of Delos. Next to Zeus, Apollo was the most important of the gods of Olympus. When five days old he throttled the Python. With his father Zeus he fought the Titans and the Giants and destroyed the Cyclops. He aided Poseidon in building the walls of Troy, and afterward sent a pestilence on the city because he was cheated out of his pay. There are many points of similarity between Apollo of the Greeks and the sun-god of the Egyptians. The arrows of Apollo correspond to the beams of the sun. His smile was essential to the prosperity of the herdsmen and the tillers of the field. People dying without sickness were thought to be struck by the darts of Apollo. In the worship of Apollo at Thebes, the peasants are said to have thrust wooden pegs into apples, to represent legs and horns, and to have offered these as an inexpensive substitute for sheep. A temple of Apollo at Delphi in Greece was a noted place of resort. His priests were supposed to be entrusted by him with information as to the future. In art Apollo is represented as youthful, vigorous, and graceful, carrying variously a bow, a quiver, a shepherd's crook, a swan, an olive branch, or a tripod. He is represented frequently as playing while the Muses dance. The most famous statue of Apollo is that called the Belvidere, preserved in the Vatican Palace at Rome. It represents him just after his victory over the serpent, Python, the terror of the people of Parnassus. In his *Childe Harold* Byron thus describes this statue:

The Lord of the unerring bow,
The god of life, and poetry, and light,
The Sun, in human limbs arrayed, and brow
All radiant from his triumphs in the fight.
The shaft has just been shot; the arrow bright
With an immortal's vengeance; in his eye
And nostril, beautiful disdain, and might,
And majesty flash their full lightnings by,
Developing in that one glance the Deity.

See DELPHI; OLYMPUS.

Apollyon, ȧ-pŏl′lĭ-ŏn, or ȧ-pŏl′yŭn, the angel of the bottomless pit, mentioned in Rev. ix: 11. Bunyan has introduced Apollyon into his *Pilgrim's Progress.* Christian wages a terrible combat with him. See BUNYAN.

Apoplexy, a disease of the blood vessels of the brain. It may take the form of the bursting of a blood vessel and the flooding of a brain area; or of a softening of the walls of a blood vessel, and the accumulation of a dam of soft material in an artery, thus shutting off the blood supply of a brain area; or it may be that obstructive material is swept into an ar-

tery of the brain from some other part of the body. In all three forms the results are much the same. One side of brain and body is paralyzed. The face becomes empurpled, the patient, unconscious. A slow pulse, dilated pupils, and chills are common symptoms. Laying on the non-paralyzed side, mustard to the feet, loose clothing, quiet, and blood letting are recommended by medical authority. High living and want of exercise are supposed to favor the disease. Excitement or anger, causing a rush of blood to the head, are immediate causes of a fit of apoplexy. Young and old are subject to it. The effects of apoplexy may pass away, but are likely to linger, and the symptoms are almost certain to recur. A person of short, stocky build, with a corpulent body and a quick temper, is supposed to be particularly liable to an attack. See DISEASE.

Apostles' Creed, "a primitive creed of the Christian church, not of apostolic origin, but a product of the Western Church during the first four centuries, not now assignable to any individual author. It was originally a baptismal confession, and was intended to be a popular summary of apostolic teaching."

THE APOSTLES' CREED.

I believe in God the Father Almighty, Maker of heaven and earth: And in Jesus Christ His only Son our Lord; who was conceived by the Holy Ghost; born of the Virgin Mary; suffered under Pontius Pilate; was crucified, dead, and buried; He descended into hell; the third day He rose again from the dead; He ascended into heaven; and sitteth on the right hand of God the Father Almighty; from thence He shall come to judge the quick and the dead.

I believe in the Holy Ghost; the holy Catholic Church; the Communion of Saints; the Forgiveness of sins; the Resurrection of the body; and the Life everlasting. *Amen.*

Apostolic Succession, in church affairs, an uninterrupted succession of bishops, and through them, of priests and deacons, by regular ordination, from the first apostles to the present day. According to this doctrine Christ ordained his apostles; they ordained others; who, in turn, perpetuated the succession. Bishops, priests, and deacons are the three apostolic orders. Ordination is not valid unless it comes in unbroken succession from the hand of Christ through the first apostles. The doctrine of apostolic succession is held by the Roman church, the Greek church, the Armenian church, the Alexandrian church, and the Anglican church (Church of England).

Appalachians, ăp-pa-lā′chi-ans, the old mountain system of eastern North America, extending from Newfoundland to Alabama, a distance of 1,300 miles. It is an old system, far older than the Rocky Mountains, and so worn by frost, air, and water that many of the original lofty ridges are now but rolling crests, bounding wide fertile valleys. The only distinct peaks left are the White Mountains of New Hampshire and the Black Mountains of North Carolina. The highest peak in the north is Mount Washington, New Hampshire, 6,279 feet; the highest peak in the south is Mount Mitchell, North Carolina, 6,711 feet. The central part, particularly the ranges of Pennsylvania and Virginia, is known as the Alleghany Mountains. The eastern fold of the Alleghanies is called the Blue Ridge, from its hazy blue color as seen in the distance by the settlers on the Atlantic coast. Appalachians and Alleghany are Indian names. Other parts of the system are known as the Catskill, the Green, the Smoky, and the Cumberland Mountains respectively. The Adirondack Mountains are a spur of the Labrador-Hudson Bay highlands, not a part of the Appalachians. It is thought, however, that the mountains of Arkansas and Indian Territory are a reappearing spur of the Appalachians.

The surface of the entire region may be understood by supposing it to have been at first a low, level plain with rivers running toward the Atlantic. In the process of mountain making we are to understand that this plain rose slowly into gigantic wrinkles two or three miles high, running parallel to the Atlantic coast. The mountain ridges rose so slowly that the rivers were able to keep their course by cutting through the wrinkles crosswise as fast as they were upheaved, for aught we know a fraction of an inch a year. In this way the famous gaps of the Potomac, the Delaware, the Susquehanna, and other cross-

wise valleys were formed. As stated, the mountain ridges have been worn down to fill up the valleys and to form the Atlantic coastal plain. Enormous swamps in the old plain were filled with vegetation, then covered with earth, and finally upheaved in mountain making, where they now constitute the coal beds of Pennsylvania, Alabama, and other states.

See articles on the various states and rivers in this region.

Appalachicola, a short but commercially important river of the United States. It is formed by the union of the Chattahoochee and Flint rivers in Georgia near the northern border of Florida. The main river, 100 miles long and navigable in its entire course, flows south through Florida and empties into Appalachicola Bay in the Gulf of Mexico.

Appendicitis, ăp-pĕn-dĭ-sī′tĭs, an inflammation of a small and apparently useless projection which grows from the extremity of the middle intestine. From its position it is thought that this projection was at one time useful to man, but it has long been disused.

It was formerly thought that the lodgment of grape seeds and other foreign substances was the chief cause of the disease. It is now known that bruises, strains, wounds, and the accumulation of undigested food cause inflammation. Bacteria are also considered to be one of the chief causes especially when acting upon a condition of lowered vitality of the organism. The symptoms of appendicitis are sharp colic-like pains, followed by dull pains localized in the region of the appendix. Fever is usually present and nausea and vomiting may occur. The first attacks are usually light, but each succeeding attack becomes more severe. Whenever appendicitis is suspected a physician should be consulted, for the disease has many complications. Removal of the appendix is the only sure cure. The operation is no longer considered difficult or dangerous.

Apperception. The mental act of comprehending new ideas by relating them to ideas already in mind. In other words the perception of new ideas in terms of the past. When the natives on the Congo River saw the first steamboat they called it a smoke boat. They were familiar with smoke and boats but their experience had given them no idea of the power of steam. They interpreted the new idea in the light of such experience as they could relate to it. This law of association is universal. Everyone sees the world in the light of his own experience. The truths of our world are determined by what we see, but we, for the most part, see only those things which we can join in our line of experience. Other things do not exist for us; their truths are not a part of our world. A farmer, a hunter and a geologist looking over the same field would each view it in a different light. The farmer would be interested in the quality of the soil; would estimate the value of the field from its probable productiveness. The hunter would be interested in looking for shelters for game and he might pay no attention to the soil. The geologist, ignoring the experiences of the other two, would consider the field in the light of geological history, try to picture to himself the changes that it had undergone in past ages and to estimate the geological age in which it was formed.

Apperception requires the activities of all mental powers. Primarily it is an act of will. We recall associated ideas, compare these with the new idea and accept or reject the new as the result of this comparison. If we find that the new idea has more points of resemblance than difference with our store of knowledge, it is retained; if we find little or no resemblance between the new and the old, the new is rejected.

There are numerous causes of difficulty in apperception. First of these is lack of knowledge with which to make connections. Unless we can find some point of contact we reject the new idea at once. The second difficulty is inability to discover existing likeness. This difficulty arises from incompleteness of our knowledge. Those who are able to discover the great underlying principles of thought, theorems, laws, are those who succeed best in their vocations. Hence in the acquisition of knowledge we should try to select and fix in mind the fundamental principles. This truth is well illustrated in the difference

between the successful and unsuccessful lawyer. The former has a comprehensive idea of the great principles of law. He is consequently able to apply them to the case in hand, while the latter, lacking this ability, is unable to make a clear presentation of the matter submitted to his charge.

Ideas that affect life—religion, politics, social customs—are perceived more slowly and with greater difficulty than ideas of external objects because their acceptance causes us to reject any previous ideas that are in conflict with them. The influence of early training remains with us through life and constitutes a powerful factor in our apperception of this class of ideas.

Educational Value. Apperception is the step from the known to the unknown. New knowledge should be so presented as to lead to related knowledge by natural and easy steps.

In teaching new subjects the teacher must take into consideration the knowledge the child already possesses. The child's first act is to discover the known qualities in the new object.

Since apperception depends upon acquired knowledge, one should gain early in life as many ideas as possible, on as many different subjects as possible. The richer the past experience, the more likely are the present responses of the mind to be correct. Like nearly all other psychological truths the law of apperception has its Biblical reference, "To him that hath shall be given."

Appert, Benjamin Nicolas Marie, (1797-1847), a French philanthropist and educator, born in Paris. He introduced into several military schools a system of mutual instruction, and conducted without charge a school for prisoners at Montaigu. It is said that he taught at least 100,000 soldiers to read and write.

Appert, Francois (? -1840), a noted French technologist, a brother of Benjamin Appert. He was the inventor of a method of preserving food without chemicals. This is described in his work: *The Art of Preserving Animal and Vegetable Substances.* It is the well-known method of placing food to be preserved in a can, heating it, and sealing hermetically. The French government awarded him a prize of 12,000 francs.

Appian Way, the most celebrated of all the Roman roads. It was begun 312 B. C. It extended from Rome to Capua, thence across Italy to Brundisium, the great stopping point for Eastern travelers. Like all other Roman roads, the Appian Way was constructed for military purposes. This thoroughfare was 350 miles in length and from 14 to 18 feet in width, with paths for foot passengers on each side. The roadway was prepared regardless of expense. Rocks were cut through, valleys were filled up, rivers were spanned with high stone arches, and long embankments were built across swamps. A bed was prepared of broken stone cemented with lime, and over all huge blocks of basaltic lava were fitted together with such exactness that the road was like one continuous flagstone. Portions of the road remain to this day. The cost must have been enormous. Historians say that the system of Roman roads of which the Appian Way was a beginning almost bankrupted the empire. Troops made great progress marching on roads like this. The Appian Way was the great highway between Rome and all points in the East. Grecian scholars and artists approached Rome by the Appian Way. Cicero, in his banishment, fled along this road. For a long distance from Rome the way is bordered by the ruins of expensive tombs and monumental buildings. The milestone nearest Rome was discovered in 1584.

Rome began her system of magnificent roads in 312 B. C. by the *Via Appia* to the new possessions in Campania. This was the work of the censor Appius Claudius. Afterward all Italy, and then the growing empire outside Italy, was traversed by a network of such roads. Nothing was permitted to obstruct their course. Mountains were tunneled; rivers were bridged; marshes were spanned for miles by viaducts of masonry. The roads were smoothly paved with huge slabs, over some two feet of gravel; and they made the best means of communication the world was to see until the time of railroads. They were so carefully constructed, too, that their remains, in good condition to-day, still "mark the lands where Rome has ruled." They were designed for military purposes; but they helped other intercourse and bound Italy together socially.—West.

Apple, a well known fruit. The apple tree is a member of the rose family to which plums, cherries, peaches, apricots, and pears also belong. Bailey says we have 1,000 varieties on the American market, and a British authority names 2,000 varieties. Our apples are all derived from wild crabs. Most kinds came originally from Asia Minor and adjacent parts of Europe, but other varieties have been obtained from the Siberian crab.

Seeds from the same apple tree produce different varieties. An apple grower lately exhibited over two hundred varieties, all grown from seeds of the same apple tree, yet differing in size, color, shape, and taste. The only way to get a certain kind of fruit is by grafting or budding. The nurseryman plants apple seeds, and, when the seedling is a year or two old, he cuts it off within a few inches of the ground and splices on a young twig from a tree now yielding the kind of fruit desired. If he wants a russet, he uses russet twigs, and the young tree will grow up a russet-producing tree. About all the care needed in grafting is to bring the fresh surface of the graft against a fresh surface of the stock grafted. A clean cut, so that the inner bark of the two may meet and allow the passage of sap, is the main idea. The joint may be protected by a ball of clay till the union is complete. Instead of grafting near the ground the stock may be allowed to grow, and twigs may be grafted on its branches. Grafts from different trees may be used so that one branch of a tree may bear one kind of apple and another branch bear apples of another sort entirely. An apple raised from seed without grafting is called a seedling. Seedlings are usually inferior, but it is by means of seedlings that improved varieties are obtained.

Among the American apples most widely grown are the pippin, golden russet, blue pearmain, northern spy, spitzenberg, willow twig, Duchess of Oldenburg, Rhode Island greening, gilliflower, wealthy, maiden's blush, winesap, and king. The Baldwin and the Ben Davis are put on the market in the greatest quantities. In point of color, flavor, and keeping qualities the Jonathan is unexcelled.

In an apple orchard the trees should be about forty feet apart to secure the best results. It requires ten years of thorough cultivation to bring an orchard into profitable bearing, but it should continue to do well for thirty years. All orchards should be on elevated ground to afford cold air drainage. Cold air is heavy and will drain off into a hollow and cause a frost there, freeing the orchard from the latest and earliest frosts. The worst enemies of an orchard are the grubs of the codlin moth and the apple scab. Both may be met by spraying with arsenical poisons.

Only those who have seen an apple orchard in full bloom have an adequate idea of what floral beauty and fragrance are. Cutting an apple crosswise gives the best view of skin, pulp, star-like core, and seeds. We are apt to speak of a red apple, but apples are of many colors, red, yellow, and green.

Owing to the fact that apple trees bloom late, thus escaping late frost, they are cultivated farther north (65° N.) than any other fruit of the sort. Apples are raised very generally throughout Europe, northern India, China, Japan, southern Siberia, Australia, Tasmania, New Zealand, Cape Colony, Canada, and the United States. The finest apple-producing region in the world runs from Lake Michigan east and northeast, taking in both shores of Lakes Erie and Ontario, to Nova Scotia. Other important regions in the United States are the foothills of Virginia and the mountain valleys of adjacent states, the Ozark and Arkansas region, the plains region, and the Pacific coast. Eastern apple growers prefer round apples. They ship to market in barrels or in bulk loose in box cars. Pacific growers favor an apple ribbed and pointed at the smaller end. They ship in wooden crates holding about a bushel.

The United States apple crop varies greatly. Forty-five million barrels may be regarded as a large crop. New York usually leads with an occasional crop of 20,000,000 bushels. Pennsylvania, Ohio,

Missouri, Virginia and Illinois follow in the order named. The following statistics of apples grown in the United States are taken from the Government records:

	Barrels		Barrels
1918	69,452,000	1920	89,470,000
1919	54,624,000	1921	38,752,000

See PEAR; WASHINGTON; BURBANK.

Apple of Discord, a golden apple noted in Greek mythology. The myth is interesting. The gods assembled to celebrate the nuptials of Peleus and Thetis. Eris, the goddess of discord, was not invited to the feast. Angered by the slight, she determined to cause strife. She threw into the midst of the gathering a golden apple bearing the inscription, "For the most beautiful." Juno, Minerva, and Venus contended for the prize. Jupiter, not wishing to decide so delicate a matter, sent the goddesses to Paris, who kept his flocks on Mt. Ida. The handsome shepherd awarded the apple to Venus. In return for this favor Venus aided Paris to win the beautiful Helen, wife of Menelaus. Paris carried Helen to Troy. They were pursued by Menelaus and thus arose the Trojan War. The term, Apple of Discord, is often used to designate that which divides friends and causes foolish contention. See PARIS; TROY.

Apples of Hesperides. See HESPERIDES.

Apples of Sodom, an orange-like fruit of fair appearance, that crumbles in the grasp into a mere handful of ashes; hence the figurative use of the expression, Apples of Sodom, or Dead Sea Apples, to describe that which attracts by outward beauty but is really worthless. The apples of Sodom belong to the nightshade family, and are related, therefore, to the ground cherry, the eggplant, the tomato, and other well known plants.

Appleton, Wis., the county seat of Outagamie Co. It is on the lower Fox River, 100 miles northwest of Milwaukee The water passing through the Fox River from Lake Winnebago gives power sufficient to supply half of Wisconsin with electricity. Dams and canals have been constructed on all rapids to utilize power. A navigable canal, under U. S. government control, allows vessels to pass from Green Bay to Lake Winnebago. Appleton is noted as a dairying center. It has modern schools and 2 business colleges, together with Lawrence College and Law- 2 business colleges, together with Lawrence Conservatory of Music. Population, 1920, 19,561.

Appomattox, ăp′pō-mat′tŭks, the name of a river, a county and a village of Virginia. The village is of most interest, since here at Appomattox Court House, as it is known in history, General Lee surrendered to General Grant, April 9, 1865, thus ending the Civil War.

Apprentice, literally, a learner. The term is derived from a French word meaning to apprehend, to "catch on." In the ordinary use of the word an apprentice is a young person placed with skilled workmen to learn a trade, and receive small wages. The labor unions of the present day are very strict in their rules, not allowing an employer to have more than one apprentice usually to four or five workmen, the number varying, of course, with the different trades. In European countries it was at one time the universal custom for a father or guardian to bind out his boy for a number of years. The lad was expected to work for his board and clothing. His master was in position to treat him humanely or like a slave. Numerous instances are related of apprentices marrying into the family and succeeding the master in the business, and, on the other hand, many instances of extreme cruelty are on record. On the completion of his apprenticeship the young workman was entitled usually to a suit of clothes, a small sum of money, and possibly the set of tools necessary to carry on his trade. Benjamin Franklin was apprenticed to his brother in Boston to learn the printing trade, but broke his articles, it may be remembered, and ran away to Philadelphia.

In this country apprenticeship has been regulated by numerous laws enacted by the various states. A minor, that is to say, a legal infant, cannot bind himself to an apprenticeship or, when formed, dissolve an apprenticeship, without the consent of his parent or guardian. A boy may be

bound until he is twenty-one; a girl until she is eighteen. The master takes the place of a parent. He may correct or restrain an apprentice in any way that would be proper for the parent; but his relation is a personal one. He has no authority to permit a third person to punish his apprentice. Unless an apprentice gives consent he may not be transferred to another master or removed to any state other than that in which the contract has been made. If an apprentice leaves his master without consent, and enters into the service of a third party, the master is entitled to all wages earned. An apprentice may free himself from his master by enlisting for military service, the claim of the nation being held superior to that of the master.

Apricot, a fine fruit half way between a plum and a peach. A native of Armenia, or, as some say, of Japan. The apricot is fond of the sun, and in Europe is trained frequently against stone walls. It blooms early, before its leaves come out, and the fruit ripens earlier than peaches or plums. For this reason the apricot is liable to suffer from early frosts. Otherwise it is as hardy as the peach, and may be raised under similar conditions. Its chief enemy is the curculio, the same insect that attacks the plum and the peach. This insect must be caught on canvas by jarring the tree, and burned. The apricot is grown very generally in peach regions. It is one of the leading fruits of California, where it was introduced at the Spanish missions as early as 1792.

The total apricot yield of the United States for 1919 was 6,130,086 bushels, of which California produced more than 6,000,000 bushels. The greater part of California's yield of this fruit is shipped in the dried or canned form. Apricots are raised from the seed. The young plant is grafted during the second summer. Apricot grafts are set also on plum and peach seedlings. The apricot is a rapid grower. The shoots require thinning out, and it is usually necessary to remove a large part of the young fruit to secure the best results.

April, the fourth month of the year. The name is from a Latin word meaning to open. The name is given appropriately to the month of opening buds. It contains thirty days. The first day of April is known as April Fool's Day. It is traditionally a day of playing harmless jokes. In English-speaking countries one who is imposed upon is called an April fool; in France, an April fish; in Scotland, the term frequently applied is a gowk. Chambers suggests that an appropriate errand for the day is sending one to the library for the life of Adam's grandfather. A typical American diversion of the day is nailing a pocketbook to the sidewalk, or attaching it to a string, so that it may be jerked away when the passing pedestrian stoops to pick it up. The origin of the day is not clear, possibly French, but, however that may be, it is just as well for one who falls into a snare to take the matter good-naturedly.

Apteryx, ăp′te-rĭks, a singular bird of New Zealand. The name is Greek, signifying without wings, for its wings are reduced to mere stumps. It is allied to the ostrich and the emu. It lives amid the ferns. It is an awkward, wingless, tailless bird about the size of a domestic fowl, and is covered with streaked brown and gray hair-like feathers. It does not see well by day. The nostrils are situated in the very tip of the bill, which is flexible like that of a woodcock, to which its manner of probing the ground for worms, and habit of feeding at morning and evening twilight, suggest a farther resemblance. The female lays two smooth greenish-white eggs, larger than those of a goose, in a scantily-lined nest at the end of a burrow dug in soft ground. During the middle of the day the apteryx sleeps, rolled up in a ball, or stands at rest apparently leaning on its bill, the tip of which touches the ground. There are several species in New Zealand and adjacent islands. These birds are much sought after for food by the natives as well as by white men. The latter have introduced hunting with dogs, and will soon exterminate this curious bird.

Aquarium, a tank of water for live plants and animals. An aquarium is not expensive nor hard to keep up. It may be a large glass receptacle or a wooden

box with glass ends. Put in an inch of sand, a few stones for shelter, some snails, some water drawn with a dipping tube from a weedy pond bottom for tiny animals, a minnow or two, and a tadpole. Root some water plants in the sand to purify the water, and let a chip float on the surface. Keep it in the light, but not in the sun, and you have an aquarium to experiment with. Country schoolteachers sometimes convert a washtub into an aquarium with great success. Some high schools and nearly all colleges and universities possess aquaria in connection with their botany and zoölogy departments. Entire rooms, or even an entire building, may be used in connection with natural history museums or biological stations.

One of the largest and most beautiful salt-water aquaria in the world is at Naples, Italy. It occupies the ground floor of a building more than 100 feet long. Glass tanks, reaching from the floor to the ceiling, are built into the walls. Salt water is being forced constantly into these tanks from the sea. Each tank is numbered, only animals representing a certain marine type are placed in each; *e. g.,* in one, only spiny skinned animals are seen; in another worms only; in still another bony fishes only. Each tank is designed to furnish the conditions or environment to which the animals are accustomed in their free state in the sea. Therefore one sees grottoes, rocks, variously colored sand, sticks of wood, debris, green, red, and brown plants, empty shells, etc., as the furniture of the tanks. Some of the animals are themselves very highly colored, red, green, yellow, blue; some are all of one color; others are spotted, striped, or speckled. The observer sees them moving about him in much the same way as if he had himself been lowered into the sea, and the plants and animals left in their accustomed places.

Aquatic, a term applied to plants and animals. It means living in the water, yet it is seldom used of plants or animals that live wholly in the water. We call all water fowl aquatic, yet we should hardly apply the term to fishes. Water lilies are typical aquatic plants, yet they bloom above water. The green thread-like algae of fresh water and the sea weeds of the ocean live wholly in or under water, yet we should not speak of them ordinarily as aquatic plants. See WATER LILY; WATER HYACINTH; BEAVER.

Aqueduct, an artificial conduit or channel for carrying water. In one sense of the word a canal or ditch, or even a water pipe, is an aqueduct; but, as used, the term refers to extensive watertight channels or flumes built, it may be, through tunnels and led across valleys on masonry, that an abundant stream of pure mountain water may be brought into a city. Such a system is possible when a city is situated on comparatively low ground.

China still uses aqueducts built centuries before the Christian era. Traces of ancient aqueducts are to be found in Palmyra of the Desert, at Jerusalem, and at Athens. Ancient Rome was supplied with water from the Apennines by nine aqueducts. Three of them are still in use. One of these was forty-five miles long. The Marcian aqueduct is carried across the Campagna, for six miles at a stretch, on arches of masonry. An aqueduct at Nimes, in France, crosses a valley 180 feet deep on three tiers of arches. Each tier is narrower than the one below. The entire structure is built of hewn stone, without cement save in the waterway at the top. One of the Roman emperors brought water sixty miles to conquered Carthage through an aqueduct resting on arches of stone work. It still supplies Tunis with water. A much admired aqueduct at Segovia, Spain, also built by the Romans, has in some parts two tiers of arches, one above the other, each 100 feet in height. Water tunnels of antiquity are equally admirable. A water pipe in Lycia, Asia Minor, consists of cubical blocks of stone, each pierced with a hole nine inches in diameter. The stones are cemented together to form a pipe a mile in length. Aqueducts in ruins and aqueducts in service are among the sights of many a European city.

One of the most celebrated American aqueducts is the Croton, leading from the river of that name thirty-eight miles into

New York City. It crosses the Harlem river on a bridge 150 feet high. Irrigation canals, true aqueducts, are built on a large scale in the West.

The Catskill Aqueduct, completed in 1913, is 92 miles long and adds 500,000,000 gallons daily to New York's water supply. The Los Angeles Aqueduct, 235 miles long, is the longest in the world. Its head is 3,800 feet above sea level, and water flows to all parts of the city by gravity. The water irrigates thousands of acres of land and furnishes power besides supplying the city.

As to the main aqueducts, which supplied Rome with a daily volume of 54,000,000 cubic feet of water, it would have been impossible to substitute metal pipes for channels of masonry, because the Romans did not know cast-iron, and no pipe except of cast-iron could have supported such enormous pressure.—Lanciani's *Ancient Rome in the Light of Recent Discoveries,* p. 60.

See IRRIGATION; SIPHON; PUMP; WATERWORKS.

Aquinas, Thomas, a-kwī′nȧs (about 1227-1274), a learned Christian philosopher. The name Aquinas is from his birthplace Aquino, Italy. He was of noble family, and was educated at a monastery and at the University of Naples. When seventeen years old he became a Dominican monk and devoted his life to teaching in various cities and to writing. His disciples called him the "Angelic Doctor." Aquinas' system of philosophy was based on the idea that man has two distinct sources of knowledge: revelation, of which Scripture and church traditions are the channels, and human reason, the channels of which are the various systems of philosophy, especially those of Aristotle and Plato. He aimed to prove that there was no incompatibility between these two sources of knowledge, since in the last resort both came from the one absolute source, God. The name of Aquinas is especially remembered in connection with the long and bitter controversy between him and Duns Scotus while scholasticism was at its height. Aquinas' writings are in Latin and all the earlier works lead up to the one great work *Summa Theologiae,* left incomplete at its author's death. The intention of this work was that it should be the sum of all known learning, systematized and subordinated to the dictates of the church. Aquinas was canonized by Pope John XXII, and is known often as Saint Thomas Aquinas. See SCOTUS, DUNS; SCHOLASTICISM.

Arabia, a-rā′bi-a, the most southwesterly peninsula of Asia, most of which lies between the Red Sea and the Persian Gulf. It is estimated that a third of it is unknown to the Christian world. The estimated area is 1,200,000 square miles; the population is about 7,500,000. The soil is capable of supporting only a sparse population unless irrigated.

Previous to 1914 Turkey had possessions in the peninsula, so had England; but most of the territory was held by Arab tribes who followed their sheiks as nomads. Palestine, located on the coast of the Mediterranean, as well as Arabia proper, belonged to Turkey. Now the former is an independent state under the protection of Britain, and the latter, united into one government to include the desert interior and the Tigris and Euphrates Valleys, where Babylon and Nineveh once stood, has sworn allegiance to the King of the Hedjaz, an Arab. His third son was an imposing figure at the Peace Conference. The new Arabia is under British mandate. The capital is Aleppo. The unification of Arabia is, however, nominal. There are a dozen or more autonomies; and also numerous tribal communities, recognizing allegiance to none but their local chiefs. These communities are settled, half-settled or nomadic, according largely to the nature of the territory they inhabit. There are, for instance, great stretches of Arabia in which a settled mode of life is impossible; and a body of people that is forever changing its abode is well nigh unable to recognize a fixed governing center.

The surface of Arabia may be divided into three regions. A comparatively narrow coast region of sands, valleys, cliffs, and ranges, partly barren and partly fertile, runs around the entire coast from Mt. Sinai to the head of the Persian Gulf. Seen from passing ships, this exterior region is in general forbidding. This is the

Arabia Felix of sacred geography,—a region of the date, the cocoanut palm, and the famous coffee originally exported from the port of Mocha. It produces aromatic plants and substances such as aloes, benzoin, balsam, frankincense, gum arabic, and myrrh, giving rise to Milton's oft quoted words:

> Sabean odours from the spicy shore
> Of Araby the Blest.

Beans, rice, lentils, tobacco, melons, saffron, olives, poppy or opium, sesame, and castor oil are produced along the various valleys and terraces of this part of the peninsula.

Within this broken border is found a second belt of similar extent. It varies in width, but, except where interrupted by the fertile district about Mecca, this region is a featureless desert of shifting sands and scanty vegetation, like that of the Sahara. This desert belt, never crossed, it is said, by the foot of Greek or Roman conqueror, shelters a third large, more elevated interior region containing large areas of fertile soil well adapted to pasturage.

This grassy region is the home of the Bedouin or unsettled Arab. Like their ancestors, the interior Arabs are nomadic in character. Their wealth consists in horses, cattle, and camels, and flocks of sheep and goats. They live in tents, and move with their flocks from place to place according to the season. The camel is described in a special article under that head. The ownership of the Arabian horse is confined entirely to the chiefs. It is considered beneath an Arab's dignity to sell his horse. Colts are brought up with the family. The genuine Arab horse is most frequently gray, then chestnut and white or sorrel, but never a dark bay. It is claimed that the Arabian horse can carry its owner at a gallop for twenty-four hours without requiring a drink.

From the seashore to the interior Arabia presents a great variety of surface. The tender-eyed gazelle, the fleetest and most graceful of the antelope kind, is still found in Arabia. The long-maned lion, the ape, tiger, panther, lynx, wolf, jackal, hyena, black-faced monkey, kangaroo rat, hare, mountain goat, and wild ass are found in one part or another of Arabia. Of birds, the ostrich, hunted for its feathers and eggs, eagles, vultures, bustards, sparrowhawks, partridges, rock pigeons, guinea fowls, ducks, cranes, larks, sparrows, finches, thrushes, and parrots are found in various provinces. Scorpions and centipedes are common in the rocks and arid regions; while bees store their honey in the rock crevices of the mountains. Flies, mosquitoes, ants, and spiders are considered unusually troublesome. Parts of Arabia are also devastated by flights of locusts related to the Rocky Mountain species that at times alights in the fields of the Mississippi Valley.

Arabia has played an important part in history. It has given the world the Arabian horse, the Arabian camel, the Moslem religion, and has sent forth the Saracenic armies that overran Syria, Asia Minor, Egypt, North Africa, and Spain.

The Arabic language is akin to the Persian and the Hebrew. At one time the Arabs were the chief scholars of the world, and possessed the largest libraries. The eminent physicians, astronomers, and mathematicians of the day were Arabians. In name as well as origin, algebra is Arabic. Bagdad on the Tigris and Cordova in Spain were famous sites of Arabic learning, and were thronged by the students of Asia and the western world before the great universities of Europe had been thought of, or were even possible.

Almanac, zenith, azimuth, and nadir; algebra, zero, and cipher; alcohol, coffee, and sherbet; elixir and syrup; sofa, cotton, and mohair; artichoke, arsenal, assassin, fakir, hegira, sumach, jar, tariff, amber, and Moslem, are all from the Arabic, indicating the extent to which we are indebted to the Arabic scholars of the Middle Ages. The influence of Arabic writers upon the literature of Europe has also been very great. Translations of the *Arabian Nights' Entertainments* are still the delight of young folks. For extravagant, fairy-land effects, the Moslem architecture of the Alhambra is without a rival.

See MOHAMMED; MECCA; ADEN; ALHAMBRA; BAGDAD; ASIA.

Arabian Education. Following the conquests of the armies of the Mohammedans in the seventh and eighth centuries A. D., the conquerors turned their attention to learning. Before Mohammed the Arabian was ignorant, a lover of the horse, hospitable, and warlike. The great prophet himself could neither read nor write. He had no confidence in worldly knowledge and made the study of the liberal sciences punishable by death. However, in two centuries after his death, the Arabians were the teachers of the world.

The Arabians were brought into contact with what learning there was through their victories. Leaders of armies met philosophers and grammarians. The science of medicine was especially interesting to the Arabians. When they captured Alexandria one John Philoponus showed his friendship for the conquering general by translating into the Arabic language extracts from the books of Galen on the bites of poisonous serpents and the cure for them. He also composed a book on Aristotle in the language of the Arabs. The kalifs in the beginning were not so enlightened. While it may not be true that one of them directed the burning of the great library with the remark that if the books agreed with the Koran they were not needed and if they did not they should be burned, the currency of the story shows the Arabian's lack of appreciation for learning. But in less than fifty years after the death of Mohammed the kalifs were enthusiastic advocates of learning. A decree was made that beside every mosque there should be built a schoolhouse. In Spain, in Egypt, in Arabia, there grew up universities numbering their students by the thousand. The Nestorian Christians, driven out of Constantinople for heresy, settled in Persia and turned their attention to medicine. They founded the medical college of Condisapore which sent out numbers of skilled physicians. Kalifs who fell ill sent for these doctors and thus came under the influence of Greek learning, for the Nestorians were eager cultivators of Greek science.

One of the kalifs, El Mamoun, threw the Nestorian, Honain Ben Ishac, into prison for refusing to teach the kalif a prescription by which the kalif might kill any enemy who became troublesome. After a year Honain was summoned before the kalif and was given his choice of death or compliance with the request of the kalif. The faithful physician declined to comply; whereat the kalif assured him that the demand was merely a test of his integrity. Said the kalif, "What hindered thee from granting our request, when thou sawest us appear so ready to perform what we had threatened?" "Two things," replied Honain, "my religion, which commands me to do good to my enemies, and my profession, instituted purely for the benefit of mankind." "Two noble laws!" exclaimed the kalif. Honain was loaded with gifts and made court physician.

As was the custom with great conquerors, Haroun El Raschid traveled with a hundred men of science in his train. His son, El Mamoun, was the greatest patron of learning among the kalifs. No religious or race prejudice prevented him from securing every scholar upon whom he might impose labors and rewards. Hungerford says of El Mamoun: "By such measures he strove to make Bagdad the residence of the choicest among the learned. His court took on the character of a great academy. The provinces of his empire were searched for precious manuscripts; his collectors were busy everywhere,—in Syria, in Armenia, in Egypt. Governors of provinces had instructions to further the work. Collections of books were taken as a tribute. Among the terms of peace with the Greek emperor, Michael the Stammerer, was the exaction of a series of the manuscripts of Greek authors. Vast numbers of books were brought from all quarters to Bagdad, constituting a library which represented the accumulated learning of the East. These contributions of the nations to Arabian enlightenment were borne on the backs of hundreds of camels, which entered the city laden with their treasures. Such a collection required numerous laborers to inspect, arrange and classify, transcribe and translate."

It is sad to relate that all the original

manuscripts were burned. Just why this was done is not known. Probably the Arabs looked upon all other nations as beneath consideration, and there was some excuse for this in the prevailing ignorance of the times among western peoples.

There was little evidence of aristocracy in these old schools. Sons of mechanics as well as the noble born were welcome. Endowments of immense sums were contributed to the support of the universities. After studying books of foreign authorship the Arabs became authors. A dictionary in sixty volumes, histories, scientific works, encyclopedias, were among their writings. They introduced our decimal notation, and were learned in other branches of mathematics.

There is little account coming down to us of the schools of the common people, the primary schools of that day. Probably there was no such school as one of our grade schools in all the Mohammedan dominions. Even the universities were dismantled when the political supremacy of the Arab was ended. Hungerford says: "While the time of its endurance is not short,—for its sway lasted through centuries,—it goes, nevertheless, as it came, suddenly. One wakes from the recital of all Arabian history as from a dream. With the passing away of other glories the glory of letters fades so completely that it is hard to realize their former supremacy over vast territories and over millions of active minds. The bustle and busy searching, the collecting and transcribing and recording, the piling up of libraries and accumulation of treatises covering every department of learning, ceases. The intellectual career of Islam is finished. In the history of the world the movement of the Arabian mind is like that of the Bedouin horde, suddenly appearing upon the desert, sweeping with dash and vigor over the sands, and vanishing again, leaving the observer surprised, wondering, and questioning."—A. W. RANKIN, University of Minnesota.

Arabian Literature. See LITERATURE.

Arabian Nights' Entertainments, a famous collection of tales written originally in the Arabic language. The author is unknown, but it is supposed that they were composed about the time of the discovery of America. A French professor traveling in Asia found a manuscript copy early in the eighteenth century, and translated the tales into French. They were soon published in English and in other languages of Europe. Other Arabic manuscripts of the tales have been found since.

The stories themselves are held together in a flimsy tale running to the effect that Queen Scheherazade, who was to be beheaded in the morning, began telling her liege lord an interesting tale which she broke off in the middle. Rather than miss the rest of the story, he deferred her execution until the following day; but repeating her tactics, she put off the evil day until one thousand and one nights had passed, each with its appropriate tale or portion of a tale. These tales are very delightful, and throw not a little light on the manners and customs of the Arabians.

Some of the better known are The Story of the Porter; The Ladies of Bagdad, and the Three Calenders; The Story of the City of Brass; The Story of the Three Sisters; Abou Hassan, the Wag; Aladdin and the Wonderful Lamp; The Sultan of the Genii; Prince Houssain and the Carpet; Sinbad the Sailor; The Barber; The Man Who Repented When It Was Too Late. The Story of Ali Baba and the Forty Thieves is usually included in the collection, but it was not in the original manuscript. The following stanza from Tennyson's *Recollections of the Arabian Nights* is expressive of the impressions made upon the mind of an imaginative boy by these weird eastern tales:

> When the breeze of a joyful dawn blew free
> In the silken sail of infancy,
> The tide of time flow'd back with me,
> The forward-flowing tide of time;
> And many a sheeny summer morn,
> Adown the Tigris I was borne,
> By Bagdat's shrines of fretted gold,
> High walled gardens green and old;
> True Mussulman was I and sworn,
> For it was in the golden prime
> Of good Haroun Alraschid.

Arabian Sea, that part of the Indian Ocean lying north of an imaginary line stretching between Cape Comorin, the southernmost point of Hindustan, and

Cape Guardafui, the most easterly point of Africa. The sea proper lies between Hindustan and Arabia; but the Gulf of Aden, with its extention, the Red Sea, and the Persian Gulf are arms of the Arabian Sea. Ships passing through the Suez Canal must cross the Arabian Sea to reach southern Asia. Bombay is the chief port on the Arabian Sea. The chief islands are Sokotra and the Laccadive Islands.

Arachne, ȧ-räk′nē, in Greek legend, a Lydian maiden who presumed to compete with Minerva in the art of weaving. As a punishment, she was changed into a spider. The story has been told by the Latin Ovid in a poem entitled *The Punishment of Arachne.* Edmund Spenser has retold the tale in *Muiopotmos,* from which the following stanzas are quoted:

Amongst these leaves she made a butterfly
With excellent device and wondrous slight,
Fluttering among the olives wantonly,
That seemed to live, so like it was in sight;
The velvet nap which on his wings doth lie,
The silken down with which his back is dight,
His broad outstretched horns, his hairy thighs,
His glorious colors, and his glistening eyes.
Which, when Arachne saw, as overlaid
And mastered with workmanship so rare
She stood astonished long, ne aught gainsaid;
And with fast-fixed eyes on her did stare
And by her silence, sign of one dismayed,
The victory did yield her as her share;
Yet did she inly fret and felly burn,
And all her blood to poisonous rancor turn.

Garrick has also alluded to Arachne in a short poem, *Upon a Lady's Embroidery:*

Arachne once, as poets tell,
A goddess at her art defied,
And soon the daring mortal fell
The hapless victim of her pride.
Oh, then, beware Arachne's fate;
Be prudent, Chloe, and submit,
For you'll most surely meet her hate,
Who rival both her art and wit.

See SPIDER.

Arago, ä′ra-gō, **François Jean** (1786-1853), a French scientist. Though dead little over half a century, Arago is a marked example of the way in which eminent men and eminent services pass from the public mind. As a student, director of the Observatory of Paris, editor of the *Annals of Chemistry and Physics,* member of the Chamber of Deputies, Minister of War and Navy, professor in the Polytechnical School and secretary of the French Academy of Sciences, he was a brilliant, able, prominent figure for half a century. With the celebrated Biot he completed the measurements of a geographical meridian on which the scientific meter is based. Among his contributions to scientific knowledge are researches regarding the polar snows of Mars, the belts of Jupiter and Saturn, sunspots, the effects of atmospheric refraction, the oscillations of the magnetic needle, the connection between the aurora borealis and magnetism, the creation of a magnet by the use of the galvanic current, the polarization of light, the construction of a polariscope, the interference of colors, and the velocity and the wave theory of light. In the discharge of legislative and administrative duties to which he was called, Arago was influential in establishing public education, in the development of railroads and telegraphs, in improving the navigation of the Seine, and in the boring of artesian wells. He abolished flogging in the navy, and brought about the downfall of negro slavery in the French colonies. He was a brilliant writer, an eloquent speaker, a public spirited citizen, and, as we have seen, contributed in no small degree to the advancement of science.

A′ragon, an ancient kingdom of Spain. It lay on the French border, midway from the Bay of Biscay to the Mediterranean. Saragossa on the Ebro was the capital. Aragon grew from 1035 to 1469 to be one of the two important kingdoms of Spain. Castile was the other. In the last named year the two kingdoms were united by the marriage of their sovereigns, Ferdinand of Aragon and Isabella of Castile. See CASTILE; SPAIN.

Aral, ăr′al, a vast inland sea of Asia, situated in Russian Turkestan. It is a shallow body of salt water with an area of 35,000 square miles. It is fourteen times as large as Great Salt Lake. The Aral receives several tributaries, the principal being the Oxus, but it has no outlet, and owing to the excessive evaporation of the hot country in which it lies, it is shrinking in size. At one time it may have been an arm of the Caspian Sea, now 200 miles distant. Its surface is 160 feet

above the ocean and 245 feet above the Caspian. Its waters are full of fish. The shores are for the most part salty wastes. Being without harbors and subject to violent storms, the Aral is not safe for navigation. A few fishing craft and Russian steamships venture on its waters.

Ararat, ăr′a-răt, a region in Armenia. In the Armenian tongue the name Ararat signifies "the plains of the Aryans," and is given to a fertile plateau in the mountainous region of Armenia. The writer of Genesis viii: 4, states that the ark "rested upon the mountains of Ararat," yet the custom has become fixed of restricting the name Ararat to a single volcanic mountain that rises to an altitude of 17,212 feet, or 14,000 feet above the plateau on which it stands. The mountain is the highest in western Asia. It is clothed with birches at its base, and rises through zones of decreasing vegetation to perpetual snow. Tournefort and other French botanists visited this region, as Ararat is not only higher but further south than Mt. Blanc. They found that as one ascends a mountain, he passes in a few hours' time through the same belts of vegetation that he finds in traveling for months toward the north pole. As they went up Ararat, they found the vegetation shorter and more scrubby until, as they neared the snow line, vegetation consisted of plants similar to those growing in frigid zones. About 1840 an eruption of sulphuric vapors burst from the mountain, and an earthquake shook vast masses of rock down its sides. A convent, a chapel, and a village of 1,000 inhabitants with pleasant gardens, were overwhelmed beneath a mighty mass of rock, debris, and ice. Mount Ararat is a corner post between Turkey in Asia, Persia, and Russia. It is called by many names, as "Giant of Armenia," "Noah's Mountain," "Dome of Eternal Ice," etc., and is said to be one of the most beautiful and impressive mountains in the world. See ALPS; TOURNEFORT.

Arbitration, International, the settlement of a dispute between nations by an impartial court. The rapid substitution of this rational process in the place of war is perhaps the greatest step in advance that marks the close of the nineteenth century. To Americans it is of peculiar interest. To submit the conflicting claims of nations (as of individuals) not to brute force, but to rational adjudication, is not more than Christian; it is not more than common sense; but, besides being in a measure both Christian and sensible, it is in its origin distinctly American,—as this article will show.

Old-World philosophers had taught for centuries that war was not only inevitable, but also beneficent and right. Thus Dante, the mightiest intellect of the Middle Ages, wrote in defense even of the absurd folly of private war, or "trial by combat,"—when God was always solemnly invoked to "show the right."

> Whatever is acquired by single combat, is acquired with Right. For when human judgment fails, either because it is wrapped in darkness or *because it has not the aid of a judge,* then . . . recourse must be had to Him who so loved Justice that, by the shedding of His own blood, He met her full demands. . . . This end is accomplished when, with the free consent of the participants, . . . the judgment of God is sought through a trial of bodily and spiritual strength.

In spite of such attempts to bolster up that judicial duel by pious phrases about the "judgment of God," the custom disappeared soon after Dante's day, in the light of advancing knowledge and with the establishment of a more efficient system of courts in European countries. But for quarrels between nations the same language continued. Thus Lord Bacon wrote (seventeenth century):

> Wars are no massacres and confusions, but the highest trial of right, when princes and states which acknowledge no superior on earth, *put themselves on the judgment of God* for the deciding of their controversies by such success as it may please Him to give to either side.

Bacon's day no longer used this silly defense for small fights, between Smith and Jones, but it still thought such impious defense good for big fights, between France and England. In our day it grows more and more impossible, by such language, to excuse ourselves, and to throw our own responsibility upon God; but the old excuse has been cast into vaguer form, —as by the English statesman, Sir Charles

Dilke, who blandly assures us, in his recent book upon *Problems of National Defense,* that war is inevitable because it is "analogous to litigation in private life."

War analagous to litigation! Of course war is analogous not to modern, peaceful litigation,—an attempt to find the right by rational, careful investigation,—but, at best, to the barbarous and outgrown "trial by battle." And, just as for individuals, in the upward progress of humanity, the feud and the duel have given way to peaceful litigation, so, for nations, war is now giving way to arbitration. That is the only analogy the case admits.

Not that anyone thinks we can always avoid war yet. We can not always avoid private fights. It is still necessary now and then for the gentleman to defend himself or another from the thug. If it were not for the policeman and the law-court around the corner, this sort of thing would be necessary oftener, and pretty good men would sometimes find fists or knives the only arguments to settle their disputes. Pretty good nations in the past have had no other way, because for them there have been no peaceful agencies at hand. Statesmen are now busied in supplying something of the kind,—not expecting absolutely to abolish war, but hoping confidently to make it less excusable, and so less frequent.

In the earlier development of this sensible process, the United States holds a proud place. America stands for Peace. This emphasis upon peace is one of her chief contributions to the world. So marked was the American opposition to a war policy, even in the infancy of our nation, that Thomas Jefferson, despairing of peace for the warring Europe of his day, wished us to cut ourselves off from the Old World that we might the better dedicate this New World to peace. "When we are strong enough to give the law for the continent," he wrote, "we may formally demand a median of partition through the ocean, on the hither side of which no European gun shall ever be heard, nor an American on the other,—while, during the rage of eternal war in Europe, within our regions the lion and the lamb shall lie down in peace."

This favorite thought of Jefferson's was soon to find recognition, in part at least, in our national policy; for it is this which makes the idealistic element in our Monroe Doctrine (see article). Even before that doctrine was proclaimed, our country, with England, and at our suggestion, gave to the world the first great illustration of practical disarmament,—in the "Convention of 1817," just after the War of 1812. In this memorable compact the two countries agreed that neither would maintain war-vessels on the Great Lakes. The agreement has been kept, spite of intrigues in Congress year after year by greedy shipbuilders and jingo politicians; and, as a result, for the century since, across those northern waters which unite the two lands, the opposite shores have smiled in constant friendliness,—when, under Old-World conditions, there must have frowned scores of grim fortresses thronged with hostile soldiery eager to pot one another. Indeed the whole history of American diplomacy has been one consistent effort to lessen the waste of war to non-combatants, and to lessen the likelihood of war itself, and to extend (sometimes to invent) the more beneficent principles of international law. Even our wanton aggression in our one unjust war was partially redeemed by a solemn pledge in the treaty of peace with Mexico (1848), that in future we would settle differences with our weaker neighbor by *arbitration.*

That device, of international arbitration, was then some half a century old, and it was practically an American invention,—the noblest product of the heart and brain of an inventive people. A score of years before the words just quoted from Jefferson were written, Benjamin Franklin said:

> We make great improvements daily in natural philosophy. There is one improvement I wish in *moral* philosophy,—namely, the discovery [invention] of a plan that would induce and oblige nations to settle their disputes without first cutting one another's throats. . . . When will human intelligence be sufficiently improved to see the advantage of this? . . . When shall we grow wise enough to substitute arbitration for war?

This is the first expression of the kind *from a practical statesman.* Franklin did

not think it needful to take high moral ground: it was a matter of common sense. To the shrewd and kindly author of the maxims of "Poor Richard," to the scientist who had snatched from the storm-cloud the secret of the lightning, to the practiced diplomat trained in all the wiles of European courts, war was "folly,"—not Bacon's or Dante's pious appeal to the judgment of God; not Dilke's approved and necessary form of "litigation"; but mere folly, and inevitable only so long as human intelligence remained too unimproved "to see the advantage" of arbitration.

Franklin wrote these wise words as our War for Independence was drawing to a close (1780). Ten years after it closed President Washington and John Jay warded off another war with England by negotiating the Jay Treaty of 1793-1794 (see article), one clause of which contained in working form that invention in moral philosophy for which Franklin had hoped. Several matters were in dispute,—among others, the boundary between Maine and the British Possessions. At the treaty of peace (1783), the line had been fixed rather carelessly, and even the map upon which it had been roughly indicated had been lost. All geographical terms used in the treaty regarding it (belonging as they did to an unexplored wilderness), were meaningless or ambiguous; and now there was an honest difference of opinion about the ownership of some eight thousand square miles of territory. The fifth section of the Jay Treaty provided that this boundary should be fixed anew, in accordance with the original intention so far as discoverable, by a "mixed commission" of experts, who should be sworn to do justice after careful examination of evidence,—both countries pledging themselves to accept the award as final.

This same provision called forth violent outcry. In England the ministry were vehemently assailed for so shamefully "compromising British honor." In America there went up a like howl from the offended jingoes. Those were the days when mobs, ten-thousand strong, gathered day after day in the streets of Philadelphia, as John Adams assures us, threatening to drag George Washington from his house. "What!" shrieked the frenzied opponents of the administration; "arbitrate the ownership of our soil! surrender a foot of American territory without first fighting to the last drop of our blood!" This silly, question-begging bombast was fitly answered by Alexander Hamilton in his famous defense of the Treaty:

> It would be a horrid and destructive principle,—that nations could not terminate a dispute about a parcel of territory by peaceful arbitration, but only by violence.

The Jay Treaty arbitration was distinctly a new thing. At all times, to be sure, nations have now and then avoided war by inviting the *mediation* of a powerful neighbor or by *diplomatic negotiation* between themselves. And either of these things is usually better than war, but neither of them is arbitration. Arbitration means neither diplomacy,—a war of wits,—nor mediation,—the decision of an arbitrary umpire, based partly on guesswork, partly on expediency, and partly on compromise; arbitration means not these, but painstaking adjudication by a sort of international court, composed as impartially as possible, with definite forms of procedure approximating to those of a law-court, hearing evidence and argument in public, and basing the decision solely on the merits of the case.

The nearest approach to this in earlier history (except perhaps for some sporadic experiments among Greek cities), was the occasional mediation of the great Catholic church in the Middle Ages. But as that period of history drew to a close the pope fell under the political control of the rising despotisms of France (see article on AVIGNON) and Spain. Then the Reformation split Christendom into opposing camps, so that the beneficent mediative power of the popes practically disappeared. Here and there an isolated philosopher urged the creation of an international tribunal for peaceful settlement of disputes, but such suggestions never arrested the attention of any practical statesmen. The sixteenth, seventeenth, and eighteenth centuries, with their incessant and almost universal warfare, knew no

such recourse; and, for the modern world, international arbitration reappeared, in a far higher form than ever before, with the Northeast Boundary Commission of 1796 established by the Jay Treaty.

The year after that treaty, the Pinckney Treaty with Spain arranged another minor arbitration; but, on the whole, the two English-speaking peoples who first used the device in this modern form continued to be its chief users for nearly a century. Speaking in the rough, the hundred years between the Jay Treaty and the Hague Tribunal saw one hundred and fifty cases of true arbitration. Of these, England, with her complex foreign relations, was a party to seventy; the United States, even with her policy of keeping free from all foreign entanglements in that period, to sixty; France to twenty; no other country to more than ten. Forty of our cases were with England. That is England had thirty cases, and we twenty, with other countries. England and America, severally or together, were parties to ninety cases, leaving only sixty for all other countries in matters to which one of these two was not a party; and these sixty came in the main, in the latter part of the century, when this Anglo-Saxon device had begun to spread rapidly to other lands,—as jury trial and representative government had done a hundred years before.

The one hundred and fifty cases dealt with all sorts of questions. Nine-tenths of them, perhaps, concerned little questions which would never have led to war anyway,—though in the absence of arbitration, even these would have led to grave injustice and would have intensified international hatreds. The remaining fifteen or twenty cases dealt with big questions which might easily have led to war. Thus our forty cases with England included such tremendous matters as the Bering Sea Fisheries, the Alabama Claims, the Venezuela Question, the Alaska Boundary, and several less important, but still highly significant, territorial disputes regarding our northern frontier.

This record of nineteenth century arbitration is a glorious history; but the closing months of that century and the opening years of the twentieth have seen something better. These nineteenth century arbitrations were all arranged by *individual* treaties, *after* the disputes arose. Now comes the day of *permanent* tribunals and *general* treaties. It is one thing for two nations on the brink of war, passions inflamed and enmities augmented, *sometimes* to save themselves by agreeing at the last moment upon a mode of arbitration. It is a nobler as well as a safer thing to agree *in advance,* by a *general arbitration treaty,* upon the composition of a *standing international court,* to which disputes are referred as they arise, without causing even talk of war. To this stage nearly all civilized states came in the organization of the Hague Tribunal (2. v.) in 1899.

WILLIS MASON WEST.

RECENT PROGRESS

No cases were referred to the Hague Tribunal until 1902 when the United States and Mexico submitted for adjudication the long-standing dispute over the Pius fund in the Californias. Other cases followed and, previous to the outbreak of the World War, cases in which the leading nations of Europe, the United States and Japan had their respective interests were submitted to the tribunal. A large number of cases were in preparation in 1914 when the outbreak of war caused all peace-movements to be set aside temporarily. The United States and Great Britain have resorted to arbitration more frequently than any other nations and always with favorable results. The case receiving the widest publicity was that of the *Alabama* claims, (See ALABAMA, THE) because of its international importance. More recent cases of wide interest include the Bering Sea seal fisheries (1892), the Alaska boundary (1897 and 1903), and the deep sea fisheries dispute with Canada (1910). During the period 1900-1914 the leading nations had apparently chosen arbitration as the most desirable method of settling disputes. In addition to the various tribunals established special treaties for settling disputes were negotiated. During 1912 and 1913 the United States negotiated a number of such treaties.

While the World War set all peace

plans aside during its existence it did not destroy the principle of arbitration. In the creation of the League of Nations, the Peace Conference provided a peace tribunal whose scope is world wide (See LEAGUE OF NATIONS). Notwithstanding the turbulent state of Europe following the war, there seems good reason for believing that in the not distant future military strife will be superseded by arbitration among all nations.

INDUSTRIAL ARBITRATION AND CONCILIATION. Controversies arising between employes and employers are frequently referred to one or more arbitrators for settlement. In cases of this sort involving the operation of public utilities, citizens, either individually or as representatives of civic or other organized bodies, arrange for a conference in hope of bringing about a speedy settlement of the controversy. Many countries have laws creating permanent boards or officials to which, either by mutual consent of both parties, or at the request of one party, these controversies may be referred for settlement. Several countries and some states of the United States require all such controversies affecting the operation of public utilities to be referred to the proper authorities whose award must be rendered before a strike can be called.

It is usually customary for the parties who have voluntarily resorted to arbitration to agree to abide by the award, but the award is not legally binding except in countries where arbitration is compulsory.

France was the first nation to resort to courts of arbitration for the purpose of settling labor controversies. These courts were established as early as 1806. Germany soon established similar courts. But only in recent years was provision made in either country for adjudicating collective disputes by these courts. In Great Britain voluntary arbitration through private boards has been encouraged by legislation for more than a century, and in 1896 provision was made for the registration of those boards with the Board of Trade. Previous to the outbreak of the World War conciliation and arbitration as a method for settling labor controversies had obtained a strong hold upon employers and employes throughout both Europe and America.

UNITED STATES. The first boards of arbitration in the United States were established in Massachusetts and New York in 1886. In 1923 over one-half the states had similar boards. Federal boards were created in 1888 and 1895. The purpose of these boards or commissions was to settle controversies between the employers and employes of common carriers. These acts have been superseded by three others—the Newlands Act of 1913, the act creating the Department of Labor and the Transportation Act of 1920. The Newlands Act provided for a national board for voluntary mediation and conciliation to consist of a commissioner and two other government officials to be appointed by the President with the advice and consent of the Senate. In four years this board heard 71 cases, 14 of which were settled wholly or in part by arbitration and 52 by mediation. The failure of the board, however, to meet the railway crisis in 1916 led to the passage of the Adamson Law which provided for a standard 8-hour day for trainmen. (See ADAMSON LAW).

In 1917 the President appointed a mediation committee from the National Council of Defense. During the operation of the railroads by the government three adjustment boards were created to equalize labor conditions under government management. The Transportation Act of 1920, among other measures, created the Railway Labor Board with power to change wages. The exercise of this power in 1922 brought on the railway shopmen's strike with which the Board was unable to cope. This states that both the railways and their employes shall "exert every reasonable effort and adopt every available means to avoid any interruption to the operation of any carrier" arising from any dispute over wages, rules of working conditions, and the Railroad Labor Board was set up as the final tribunal for the settlement of railway labor disputes.

The Secretary of Labor has power to act as mediator and to appoint commissioners of conciliation in labor disputes whenever

in his judgment the interests of industrial peace will be served by so doing. Since its creation the Department of Labor has settled a large number of labor controversies. During 1919 there were 1,780 assignments to commissioners of conciliation. Of these cases 1,223 were adjusted. Numerous temporary measures and special commissions were necessary to adjust new conditions constantly arising during the war.

CANADA. In 1907 the Dominion Parliament passed the Industrial Disputes Investigation Act. This act applies to all disputes involving ten or more persons who are engaged in mining or in the operation of public utilities including railway and steamship lines, telegraph and telephone communication and water power, gas and electric light service. This act requires employers and employes to give at least thirty days' notice of intended changes affecting wages and hours of employment. The act provides for cessation of hostilities prior to or during the reference of such dispute to a board of conciliation and investigation. Both parties to the controversies are forbidden to engage in strikes or lockouts or to do anything that will affect existing conditions of wages or hours of work prior to the announcement of the board's decision. The investigating boards appointed under this act do not have power to enforce their decisions. But the publication of the actual facts in the case usually leads to a settlement because the weight of public opinion in most cases makes it advisable to accept the award. The continuation of the act without modification is proof of its success.

GREAT BRITAIN. Previous to the outbreak of the World War disputes between employers and employes were usually settled by discussion between the interested parties. Voluntary conciliation boards were established in all important industries and these boards settled many disputes. The Conciliation Act of 1896 conferred upon the Government power to act in labor disputes. However the law was seldom applied until the general labor unrest for three years preceding the outbreak of the War compelled Government attention.

The War created such a demand for supplies that the Government took measures to prevent stoppage of work.

In 1915 the committee on production was established to report on the best means to insure the greatest productive power of employes in engineering, and shipbuilding establishments working for the Government. Later this committee was absorbed by the Ministry of Munitions. The Munitions Acts followed in 1915, 1916, and 1917, the chief purpose of these acts was to compel agreement between employers and employes and to prevent curtailing productions in all commodities needed in the army.

Immediately after the close of the War the Wages Legislation Act was passed as a temporary measure, and the Government signified its intention to withdraw from labor disputes, leaving them to be settled by the parties to the controversy.

The collapse of industry in the years immediately following the War caused such an outburst of unrest that the Government found it necessary to take further action. Various committees were appointed and temporary relief measures were established. The most important committee was the Whitley Committee appointed in October, 1916, to make suggestions for securing permanent improvement of the relations between employers and employes. This committee formed the basis of the Government's later policy regarding strikes and lockouts. The committee recommended establishing joint industrial councils of employers and working people in every organized industry, the extension of trade boards for poorly organized trades, and the temporary establishment of other bodies for intermediate trades. These councils are to give regular consideration to all matters pertaining to the welfare of the industry in which they are engaged. National councils are to be supplemented by district councils and work committees to deal with district and local conditions. The Government approved the suggestions of the committee and in 1920 the organization of councils began.

The movement does not contemplate compulsory arbitration.

Other Countries. In Norway compulsory investigation and delay are required before stoppage of work can take place. In Sweden three new measures were adopted in 1920. The first amended and extended the law relating to the appointment of local conciliators; the second establishes a permanent court of arbitration and the third relates to the appointment, on request, of arbitrators of industrial disputes arising out of collective agreements. Rumania prohibits strikes and lockouts without attempt at conciliation. The law in Switzerland provides for the appointment of permanent cantonal committees which may intervene on their own initiative or on request of one of the interested parties. In 1920 Germany enacted legislation requiring the establishment of works councils which are required to appeal to a committee or an arbitration board, to be agreed upon in case of failure of the parties to the dispute to reach a settlement. Strikes and lockouts affecting the supply of gas, water and electricity are permissible only after three days following the publication of the award by a competent committee of conciliation.

Arbitration, Commercial. Courts of commercial arbitration or trade courts have been in existence in England for a term of years. The first trade court in the United States was established by the Chicago Association of Commerce and opened in that city May 4, 1921. Provision for the court was made in the Illinois Arbitration and Award Act passed in 1917 and amended in 1919. In accordance with the terms of this act, all persons having requisite legal capacity, may by signing an instrument in writing submit to one or more arbitrators to be named in such manner as indicated in the writing any controversy existing between them. The number of arbitrators may be one or more as agreed upon by the parties. A submission to arbitration shall, unless contrary intention is expressed therein, be irrevocable.

Each arbitrator before he enters upon his duties is sworn faithfully to examine and determine fairly to the best of his ability the matter in dispute. Questions of law may, upon the request of either party or on the judgment of the arbitrators, be submitted to a court for an opinion and the opinion shall bind the arbitrators in making the award. The arbitrators have the same authority as the court in subpoenaing witnesses and taking testimony.

Jurisdiction. The jurisdiction of the trade court is limited to cases involving business disputes. It has no jurisdiction over semi-criminal cases, divorce cases or labor disputes.

Advantages. The following advantages are claimed by the trade court: (1) It saves time. Cases do not have to wait their turn on a crowded court calendar. (2) It saves expense, since the method of procedure is direct and simple. (3) It provides arbitrators, who by long experience in business, are experts in deciding the matter at issue. (4) It avoids publicity which is a necessary attendant to a court procedure.

Conclusions of fact are final but questions of law may be reviewed by the court selected by the parties. An appeal may be made to the Appellate or Supreme courts to review the conclusions of the arbitrators and to the lower court on the questions of law the same as in other cases.

Arbor Day, a day set apart for planting trees. The first designation of a public day for tree planting was brought about in Nebraska in 1872 by J. Sterling Morton, afterwards United States commissioner of agriculture. In 1885 the legislature of that state designated April 22, Mr. Morton's birthday, as a legal holiday, to be observed, especially by school children, as an arbor day for the planting of trees. Other states have followed this excellent example, until only one or two states have failed to set apart an arbor day. The date depends of course on the climate. In some states the exact date is left to be fixed from year to year by proclamation of the governor. Texas and Alabama, having an early spring, have designated February 22, or Washington's birthday, for tree planting. Georgia takes

a day in December, and Florida in February. West Virginia sets aside a day in the autumn and another in the spring. The more northerly states have adopted a date in May. The following is a full list of arbor days. It affords an interesting study in climate:

Alabama—February 22.

Arizona—Friday following first day of April, also Friday following first day of February.

Arkansas—First Saturday in March.

California—Observed by separate counties, but not generally.

Colorado—Third Friday in April.

Connecticut—Date fixed by governor, last Friday in April or first in May.

Delaware—Date fixed by governor, usually in April.

District of Columbia—Not observed.

Florida—First Friday in February.

Georgia—First Friday in December.

Idaho—Last Monday in April.

Illinois—Date fixed by governor and superintendent of public instruction.

Indiana—Last Friday in October.

Iowa—Date fixed by governor.

Kansas—Date fixed by governor.

Kentucky—Not regularly observed.

Maine—Date fixed by governor, usually early in May.

Maryland—In April; date fixed by governor.

Massachusetts—Last Saturday in April.

Michigan—Last Friday in April.

Minnesota—Date fixed by governor; usually last of April or first of May.

Mississippi—December 10.

Missouri—Friday after first Tuesday in April.

Montana—Second Tuesday in May.

Nebraska—April 22.

Nevada—Date fixed by governor, usually in April.

New Hampshire—No date fixed, usually in May.

New Jersey—Date fixed by governor, usually third Friday in April.

New Mexico—Second Friday in March.

New York—Friday after first of May.

North Carolina—October 12 usually observed.

North Dakota—First Friday in May.

Ohio—Second or third Friday in April.

Oklahoma—Second Friday in April.

Oregon—Second Friday in April.

Pennsylvania—In October; date fixed by superintendent of instruction.

Rhode Island—Second Friday in May.

South Carolina—Third Friday in November.

South Dakota—Date fixed by governor.

Tennessee—Date fixed annually in November.

Texas—February 22.

Utah—April 15.

Vermont—Date fixed by governor, latter part of April or first of May.

Virginia—Not regularly observed.

Washington—Irregularly observed; date set by governor; different dates east and west of the Cascades.

West Virginia—Third Friday in April and third Friday in November.

Wisconsin—Date fixed by governor.

Wyoming—Date fixed by governor.

Arbor Vitae (tree of life), a small evergreen, coniferous tree, from ten to fifty feet high. Arbor vitae is related closely to cedar and, in fact, is sometimes, though incorrectly, called white cedar. The spray of the arbor vitae is very flat and two-ranked. This evergreen is a favorite in dooryards. The native home of the common species is in swamps and on cool rocky shores from New Brunswick to Pennsylvania, along the mountains to North Carolina, and westward to northeastern Minnesota. To succeed in dooryards, arbor vitae must be mulched heavily with chips, and even then it is apt to winter-kill. Five species occur in North America and Asia out of which gardeners have succeeded, so they say, in developing fifty varieties. An oil is obtained from the twigs by distillation. The wood of the stem is soft and light, but tough and durable, and bears exposure to the weather very well. In Great Britain it is planted as an ornamental tree, but it does not grow so well as in America. An arbor vitae, a native of China and Japan, is also used for ornamental purposes in Europe, but is more sensitive to cold than is the American species. Hedges of arbor vitae are unsurpassed for beauty. See CONIFERS.

Arbutus, ar′bu-tus, **Trailing,** a fragrant ground plant of the heath family. The trailing arbutus is to be sought in early spring in sandy or rocky woods under the evergreens. The runners are slightly woody. The whole plant is hairy. The corolla is salver-shaped with a five-parted spreading border. The flowers are apt to be hid in old leaves but their fragrance cannot be overlooked. This hardy little plant is found in favoring localities east of a line drawn from Florida by way of Kentucky, Michigan, and northeastern Minnesota to northwestern Canada. One authority credits Texas with being the home of the plant. A near relative is to be found in Japan. The botanical name, *Epigaea,* means "on the earth" and is quite appropriate.

I wandered lonely where the pine trees made
Against the bitter East their barricade,
And, guided by the sweet
Perfume, I found, within a narrow dell,
The trailing spring flower tinted like a shell
Amid dry leaves and mosses at my feet.
—Whittier, *The Trailing Arbutus.*

Arcadia, är-kā′dĭ-a, a district of ancient Greece. It was situated in the heart of the Peloponnesus, and entirely surrounded by mountains. Arcadia was proverbial for the contentment and simple happiness of its people. The name, Arcadia, has come to be used figuratively for any scene of rural simplicity and peace. Arcadia in modern geography is a nomarchy, or county, of Greece. Arcady is an obsolete form of Arcadia, often used in poetry.

The later Roman poets were wont to speak of Arcadia as a smiling land, where grassy vales, watered by gentle and pellucid streams, were inhabited by a race of primitive and picturesque shepherds and shepherdesses, who divided their time between tending their flocks and making love to one another in the most tender and romantic fashion. This idyllic conception of the country and the people is not to be traced in the old Hellenic poets, who were better acquainted with the actual facts of the case. The Arcadians were sufficiently primitive, but there was very little that was graceful or picturesque about their land or their lives.—C. H. Hanson, *The Land of Greece.*

The history of the rise in modern literature of an ideal Arcadia—the home of piping shepherds and coy shepherdesses, where rustic simplicity and plenty satisfied the ambition of untutored hearts, and where ambition and its crimes were unknown—is a very curious one.—Mahaffy.

Arcadia, a pastoral romance in prose and verse by Sir Philip Sidney. Tragic images, shipwrecks, attacks by pirates, fights, and abductions, are interwoven with scenes of piping shepherds, gaily dressed ladies in daisy-studded fields, masquerading princes, and songs and dances innumerable. Sidney himself said of it, "It is a trifle, my young head must be delivered." See SIDNEY, SIR PHILIP.

Live ever, sweete booke; the simple image of his gentle witt, and the golden pillar of his noble courage; and ever notify unto the world that thy writer was the secretary of eloquence, the breath of the muses, the honeybee of the daintyest flowers of witt and arte, the pith of morall and intellectual virtues, the arme of Belonna in the field, the tongue of Suada in the chamber, the sprite of Practise in esse, and the paragon of excellency in print.—Harvey's *Pierce's Supererogation.*

Sir Philip Sidney's *Arcadia,* the immortality of which was so fondly predicted by his admirers, and which, in truth, is full of noble thoughts, delicate images, and graceful turns of language, is now scarcely ever mentioned.—Irving, *The Sketch Book.*

FROM THE ARCADIA.

They are termed shepherds,—a happy people wanting little because they desire not much.

Provision is the foundation of hospitality, and thrift the jewell of magnificence.

His word was ever led by his thought and followed by his deed.

Who only sees the ill is worse than blind.

Arch, in the art of building, a series of stones or bricks arranged side by side in a curve in such a way that, if the two ends of the arc or bow be kept in place, the portions of the entire arch support each other. At first thought it would seem impossible to bridge a river with short stones or bricks, but if a framework of timbers be constructed with a curved surface on which the mason may build, the staging may be removed and the arch will not only stand, but will support any weight not great enough to crush the material of which it is built. The curvature of the arch causes a weight to act in a sidewise direction as a crushing, not a breaking force.

Curved arches above windows and doorways were known certainly to the Egyptians and the Assyrians at least two centuries B. C. The Etrurians left cut

stone arches. Where the Romans got the idea, nobody knows, but they were the first builders to bring the arch into general use. The Greeks were able to bridge a space no wider than the length of a single slab of stone; the Romans not only bridged windows and doorways, but wide halls. By the aid of the arch they built lofty domes and wide gateways. They carried their famous aqueducts across valleys over long series of stone arches. Their streets and public places were adorned with triumphal arches erected in memory of Titus, Severus, Constantine, and other distinguished conquerors. This custom has been followed in Paris and other European cities. The Dewey arch in New York City is perhaps the most prominent American example of this sort of thing.

The round arch of the Romans was succeeded by the pointed arch of Gothic architecture, used in the beautiful cathedrals of western Europe, and by the Moorish arch employed in the Alhambra and other creations of Arabic genius. Modern arches have been constructed of concrete. The term is applied also to bow-like spans of iron work used in bridge construction. Arches of masonry carrying roadways are seen everywhere. One of the longest, but not the longest, span in the world, is that of the Cabin John bridge near Washington, D. C., 220 feet in length. A span at Plauen, Germany, is 295 feet long. The Eskimo employs the principle of the arch in building his snow huts.

See ARCHITECTURE; BRIDGE.

Archaeology, the science of antiquities. The subject as defined by the *Century Dictionary* is "that branch of knowledge which takes cognizance of past civilizations, and investigates their history in all fields, by means of the remains of art, architecture, monuments, inscriptions, literature, language, implements, customs, and all other examples which have survived."

Most archaeologists exclude the study of written records. In the first place, they are interested in the rude beginnings of mankind; and in the second place, they take the ground that this kind of investigation belongs rather to the historian. Archaeology, however, is an aid to history. It supplies the means of confirming or rejecting written testimony, and, in the absence of writings, the historian may draw shrewd inferences from antiquities. Chronicles may err, but seeing is believing. When the archaeologist finds a dated coin beneath the ashes of a lake dwelling, he is in position very possibly to aid the historian in fixing, more or less definitely, some date required in connection with local history of the region. But coöperation with the historian is only one kind of service. The archaeologist is engaged independently, as well, in discovering and inferring and reconstructing the long pathway trod by mankind before the dawn of history.

One great obstacle to the use of antiquities as historical material lies in the uncertainty of date. Major Powell states that many collectors have paid high prices for relics of the mound builders, when, as a matter of fact, the "antiquities" in question are articles made by whites in recent times, bartered, little doubt, for furs or other Indian possessions. The first decisive achievement, and, in fact, the great achievement, of archaeology, is the discovery and mapping of the route by which savages passed on their way to civilization. The modern archaeologist holds that while some peoples have journeyed faster than others, all have trod the same pathway. According to this theory, even the most enlightened nations have come up, step by step, from savagery. It is possible to point out five distinct stages of advancement.

1. THE EOLITHIC AGE. The dawn of stone implements. This age is marked by the use of horns, claws, beaks, bones, shells, and other bestial organs for awls, arrows, harpoons, and spears. Such tools served for piercing and tearing, but hardly for cutting. Tools of vegetable origin were, no doubt, in use, but they have decayed, leaving no clue.

2. THE PALEOLITHIC AGE. The old stone age. Stone hammers, stone mortars, flint knives, mark this period.

3. THE NEOLITHIC AGE. The late stone age. The materials used are the

same, but the tools are made with more skill and show better finish. Wooden houses, wooden ships, wooden yokes, wooden plows, were fashioned without metal and without the aid of metal tools. The American Indians were found in this stage.

4. The Bronze Age. This was an age of rapid advance. Bronze axes, bronze chisels, bronze knives, bronze swords, bronze kettles, bronze pins, and bronze articles innumerable enabled the hunter, the farmer, the builder, and the trader to get on. The very idea of a bronze foundry, however crude, distinguishes a people or a tribe from those who have no implement or weapon save such as may be picked up on a shore or torn from a dead animal.

5. The Iron Age. This is the age in which we live, though many writers are inclined to claim that we have advanced into the Steel Age.

The second broad principle advanced by the archaeologist is that a people left to nature passes through the stages in the order named. The first step is the use of tools provided by nature; the second, the making of tools from stone; third, the improvement of stone tools and the fashioning of useful articles without the aid of metals; fourth, the employment of metals easily worked, as copper and bronze; and, lastly, the use of iron. Tribes in their infancy learn to walk before they run.

A third archaeological principle runs to the effect that no length of time may be set during which a people may be expected to complete an apprenticeship in the tools of a particular age. A recent writer insists that in localities, the old stone age, the age of flint, lasted 100,000 years. About the only point agreed upon in this connection is that the age of flint is longer than all the rest put together.

Still a fourth principle of importance should be understood. The beginning and end of an archaeological age is not uniform for all parts of the world. The Egyptians were 2,000 years later in reaching bronze implements than were the Assyrians. Tribes may yet be found that are unacquainted with the use of metals and whose stone implements are rude. They are still in the paleolithic age.

Students of archaeology are assisted by the material now to be found in museums. The National Museum at Washington, the Peabody Museum of Harvard, the American Museum at New York, the Field-Columbian Museum at Chicago, and many others, contain priceless collections of Indian implements and articles of Indian manufacture.

The large university museums and the royal, that is to say, the public, museums in the various capitals of Europe, shelter enormous, and, in many cases, rapidly increasing collections.

Archaeopteryx, är-kā-ŏp′te-rĭks, a genus of fossil birds. In 1861 Andreas Wagner, observing a sheet of slate in the lithographic quarries of Solenhofen, Bavaria, noted a peculiar fossil impression, the imprint of a feather. Two other similar fossils, but in this case skeletons, were found in the same locality. They enabled scientists to make out a flying creature to which they have given the name archaeopteryx, meaning ancient wing or bird. This strange combination had the body and short wings of a heavy bird, but it had the head, teeth, long neck, and long tail of a lizard. These fossils occur in rocks older than the rocks in which bird fossils are found. Students have long been of the opinion that birds are a higher development of reptiles. In these nondescript animals of the air, we have reptiles half way developed into birds—a striking confirmation of the reptilian theory of bird origin. One of the skeleton fossils has been secured for the British Museum; the other is in the Museum at Berlin. The impressions in the fine grained lithographic stone are clear.

Archangel, an ancient seaport on the Arctic coast of Russia. Latitude 64° 32′ N., longitude 40° 33′ E. Archangel is situated on the east bank of the Dwina, twenty miles from the White Sea. It is connected with Moscow by railway, and is noted, not only as the most northerly railroad terminus in Russia, but as the most ancient, and for several centuries the only, seaport of that country. From western Europe it is approached only by a long voyage around the north of Norway

Archangel is the leading commercial city of Northern Russia, and its harbor, deepened to 22 feet, though ice-bound from October to May, is visited each year by about 800 vessels. It is connected by the Dwina River with a fine system of inland waterways which connect it with the inland cities of Russia. The chief exports are timber, fish, furs, cereals, wax and caviare. The imports are chiefly coal, salt, machinery and fruit. Large saw mills have sprung up in the vicinity. Archangel has a beautiful cathedral, a museum, a town hall, and a marine hospital. During the World War it was one of the chief ports of communication between Russia and the Allies. Population, about 43,600.

Archbishop, a bishop of the highest rank. In the early days of Christianity, the pastors of the various churches were called bishops. After a time the bishops of the large cities, surrounded as they were by many smaller churches, were called archbishops by way of distinction. The bishop of Alexandria was one of the first, if not the first, to claim the title. The Roman Catholic church is the only one that has archbishops in this country.

Archery, the use of the bow and arrow. Archery appears to have been little practiced by the Greeks and Romans; but auxiliary troops, employed by both of these nations were armed with the bow and arrow. The Scythians were skilled in the use of the bow. The enormous armies of Xerxes and Darius were composed in part of archers drawn from the oriental nations. The Egyptians were noted for the use of the bow and arrow. In the Middle Ages the men of Burgundy were famous archers. William the Conqueror owed his victory at Hastings quite as much to the superiority of his bowmen as to the weight of the Norman battle-ax. Arrows fell as thick as hail. The English bowmen gave a good account of themselves at the battles of Crecy, Poitiers, and Agincourt. The English bow was as long as a man; the arrow half as long as the bow. In their contests with the Scots, the superiority of the English bowmen was a great advantage. It was the favorite boast of the English archer that, in his two dozen arrows, he carried the lives of four and twenty Scots at his belt. The bow and arrow of the American Indian was by no means a weapon to be despised. The Chippewas and Sioux depended on their bows and arrows to take wild fowl and buffalo. The Comanches and the Apaches were formidable bowmen. In shooting at wild fowl as they rose, the Indian not infrequently lay on his back, threw up his legs, and bent his bow by holding the string in his hands and pushing the wood away with his toes.

The earliest arrow heads appear to have been made of flint or chert, chipped to the desired sharpness of edge. Heads of this description are found all over Europe and Asia, and in North America. Many savage tribes still depend upon stone for their arrow points. The shaft, whether a reed or a wooden rod, was usually split to receive the neck of the arrow, to which it was bound by a thong or a piece of sinew. Many of these flint arrow heads are exceedingly symmetrical. The next step appears to have been the use of bronze. The famous archers of the Egyptian army used bronze arrow heads fitted to reed shafts somewhat less than three feet in length. These tips were cast. Specimens are still found in burial places. Iron and steel points shaped on an anvil are a later invention.

> For fishing, hunting, and wars they use their bows and arrows. They bring their bows to the form of ours by scraping with a shell. Their arrows are made, some of straight young sprigs, which they head with bone two or three inches long. These they use to shoot at squirrels on trees. Another sort of arrow is made of reeds. These are headed with splinters of crystal or some other sharp stone, the spurs of a turkey, or the bill of some bird. For a knife they use the splinter of a reed. To make the notch of their arrows they have the tooth of a boar set in a stick. With the sinews of deer and the tops of deers' horns boiled to a jelly they make a glue that will not dissolve in cold water, and with this they glue the head to the end of their arrows.—John Smith, *The Virginia Indians.*

Archimedes, ăr′kĭ-mē′des (287-212 B. C.), a philosopher of Syracuse. He is supposed to have studied at the peculiar university connected with the Alexandrian library. While in Egypt, so it is said, he invented what is known as Archimedes'

screw. It consists of a hollow tube, wound in a spiral fashion around a central cylinder. If the cylinder be placed in a slanting position, with the lower end of the tube under water, and the cylinder turned with a crank, water may be elevated through the spiral. This device was of use to the Egyptians in draining their lower lands after the overflow of the Nile. It is still in use in Holland, where water screws are turned by windmills to drain the lowlands behind the dikes. Archimedes, speaking of the lever, is said to have declared, "Give me a place to stand and I will move the world."

Archimedes is credited with the discovery of the principle known by his name, namely that if a solid be immersed in a liquid, the loss of weight by the solid is equal to the weight of the amount of liquid displaced. A cubic inch of silver and a cubic inch of gold immersed in a liquid displace a cubic inch each, and suffer an equal loss of weight; but a pound of gold occupies less space than a pound of silver. It therefore displaces less of the liquid and suffers a smaller loss of weight. When immersed in water, gold loses a little less than one-nineteenth of its weight; silver considerably more than one-tenth.

A story runs to the effect that King Hiero trusted an artificer with a quantity of gold out of which to make him a crown, but that, having occasion to doubt the honesty of the workman, he sent the crown to Archimedes for an examination. While in a public bath and noticing the height to which his own body caused the water to rise in the tub, it occurred to the philosopher that if he were to ascertain the loss of weight of gold in water, and compare it with the weight of the crown in water, he could determine the amount of gold that had been stolen and replaced by a baser and lighter metal. So overjoyed was he, so the story goes, that he sprang from the bath and ran home without a stitch of clothing, crying, "Eureka, Eureka! I have found it! I have found it!"

During the siege of his native city Archimedes is said to have set fire to a Roman ship with a burning glass. He perished at the hands of a common Roman soldier, who knew no better than to slay the greatest scientist of the day. Cicero, once appointed governor of Sicily, reported finding the tomb of Archimedes overgrown with briars. His monument bore an inscription of a cylinder in which a sphere was inscribed, a fitting testimonial to Archimedes' discovery of their relative magnitude.

Architecture, är′kĭ-tĕc-tūr, the art of building. Passing by the tepee, the lodge, and the wigwam of the Indian, the tent and the snowhouse of the Eskimo, the tree dwelling of equatorial Africa, the lake dwelling of the Peruvian and ancient Swiss, the hut of the Hottentot, the bamboo house of the Orient, the cabin of the peasant, and the log house of the settler, we may say that the study of architecture begins with the more permanent and pretentious, the more highly ornamental buildings of various countries and peoples. We may include buildings made of a wide variety of material, as adobe, bricks, stone, wood, concrete, stucco, plaster, glass, and metal; but the builder or, at least, the designer, the architect, must have more than the rude skill of the savage. Whatever the material used, an architectural building cannot be put up by mere hand and eye. It requires to be planned beforehand, and to be erected under the supervision of a mind skilled in measurements and drafting, and with an artistic sense of proportion and fitness. Each portion of a building, whether a wall, pillar, doorway, window, or cornice, must be of the right proportions to delight the eye and produce a feeling of pleasure. As the painter relies on color, the sculptor on form, and the musician on harmony, so the genuine architect relies on the perfection of proportion to please the mind and must go about his work in no haphazard way.

Beginning with the far East, it may be said that the prevalence of earthquakes and the probability that buildings of size and height would be shaken down, have prevented the Chinese and Japanese from developing the architectural skill that might be expected from so ingenious a people. The royal palace of Tokio is but a one-story wooden building. The great

majority of the buildings of farther Asia are made of light bamboo. They are erected easily, are burned frequently, and are replaced readily. In China, Burma, and India, we find the sacred pagoda, a pyramidal tower from three to thirteen stories high, always an odd number. It is connected frequently with a temple, and is erected on some spot sacred to Buddha, or as an evidence of the builder's piety. Height and stability are secured by the pyramidal shape.

Next to the great pagodas in interest are the rock-cut caves of India. Not less than a thousand temples and as many monasteries are found in India, cut in natural cliffs of rocks. Sometimes the chambers within are of vast extent. The roof is supported on massive pillars of undisturbed stone. Not infrequently a square of the roof is removed to admit light and air into an interior court. The caves of Ellora extend three or four miles into the solid rock. The more important portion is described as a temple of great extent, with halls, aisles, courts, passages, pillars, and colonnades, with carvings, figures, and friezes complete, not built, but cut out of the solid rock. The temple stands in the open of a large excavated quadrangle or pit, which is surrounded by pillars with chambers within, all on a scale of no little magnificence. This immense temple with all its ornaments and surroundings was cut out of the living rock about 1000 A. D. The entrances to these rock caves were ornamented by elaborate pillars and porticos cut in the face of the cliff.

The princes of India built tombs and temples of masonry of great magnificence. We need only mention the Taj Mahal, the celebrated mausoleum built by the emperor in a beautiful garden a mile east of Agra. It stands on a rectangular platform with a minaret 133 feet high at each corner. It is an octagonal building with sides measuring 130 feet each. The walls are 70 feet high, and are surmounted by a dome 120 feet high, rising to a total height of 190 feet. The entire building is of dazzling white marble with interior finish of surpassing beauty in lapis lazuli and other stones worked into a mosaic. Twenty thousand workmen are said to have toiled over twenty years in the erection of this burial place. It cost from ten to fifty million dollars. The artistic ability of Indian architects is just becoming known. A work consisting of several hundred sheets in portfolios, illustrating the lace-like details into which the artisans of India fashioned the marble of their temples, and the exquisite coloration employed in interior decoration, has been issued by one of the wealthy native princes. It has proved a revelation to the architectural world.

We are indebted to explorers and excavators for our knowledge of the buildings in the Tigris-Euphrates Valley. They were constructed not infrequently of adobe or sundried brick, with pavements and wainscoting of vitrified and beautifully colored tiling, or else slabs of carved alabaster. For some account of the palaces, hanging gardens and walls and temples of this region, the reader is referred to the articles on Babylon and Nineveh. The historians of art claim that Greece learned much from the architects of this region. Remains of great extent are found in Persia, especially at Susa and Persepolis. The temples, treasures houses, and palaces of these ancient capitals are quite different from those of Greece, but appear to have been suggested by the same models, possibly those of Babylonia.

The Jews have made no notable contributions to the art. The temple of Solomon from which Christ drove out the money changers, was a rectangular building 110 feet long by 36 feet wide, and 55 feet in height. Its walls were of stone. It was roofed and floored with cedar, and was surrounded on three sides by priests' chambers. Across the front a wide porch extended. A vast amount of gold was used in gilding doorways, floors, and walls. The details of the building are not understood thoroughly, but it is conceded that Solomon's temple is interesting chiefly from the side of sacred history.

The principal buildings of the ancient Egyptians were the pyramids, and the tombs and temples of upper Egypt. The reverence in which the Egyptians held the

bodies of their ancestors led to the use of a large part of the national wealth in constructing chambers for the storing of mummies. The Great Pyramids, one of the wonders of antiquity, were constructed to serve for both tombs and monuments. Many structures on a smaller scale have escaped total destruction. Even more interesting are the rock-cut royal tombs of this region, some of which extend several hundred feet into the solid rock with many a chamber and sculptured passage. One of the largest at Thebes contains passages, in all, a sixth of a mile in length. Rock-cut temples are numerous. The doorway of one in Nubia, cut in the face of a rock, is flanked by two sculptured figures or statues sixty-six feet high. Temples cut out of the living rock appear to have suggested temples built of masonry,—small ones at first, then larger edifices, as the mason learned to handle his material. The temple at Edfoo on the Nile, above Thebes, is named as the most striking example of the Egyptian building art. In form it is a large parallelogram with a doorway 50 feet high, flanked on either side by massive towers 110 feet high. The entire front is 250 feet wide, adorned with colossal figures, some of them 40 feet in height. An open court within is surrounded by imposing colonnades, whose columns are 32 feet high. Passing toward the rear, through successive chambers, mystery and awe deepening at every step, the door of the sixth passage, when in a state of preservation, admitted the high priest to the sacred inner chamber, the holy of holies. The entire temple suggests not only the temple at Jerusalem, but is evidently of a type studied by the architects that planned the temples of Greece. Still larger, but built on the same plan, is the temple of Karnak, twice as large as St. Peter's at Rome, and covering five times as much ground as St. Paul's at London. Connected with these temples are long avenues guarded by rows of sphinxes and gigantic sitting statues. One of Memnon is 53 feet high with a face alone 7 feet long. Square obelisks cut from a single stone stood in pairs at the entrances. Cleopatra's Needle in Central Park, New York, was such a stone from the temple of the sun. In point of magnitude and cost of erection, the public buildings of Egypt exceed all others of antiquity.

The architecture of Greece is without a rival. No doubt Greek architects learned from other countries, possibly Babylonia, certainly from Egypt. Not a single Grecian temple is standing intact, but enough may be seen to warrant the assertion that in simplicity and harmony, and in the beauty of form and proportion, the work of the Greeks has never been surpassed. Compared with the exquisite workmanship of the Greeks, the finest and most impressive specimens of the building art found in the countries previously mentioned, seem crude and lacking in refinement,—the products of creative minds, but of minds lacking in delicacy and good taste. If we except certain ancient ruins of uncertain significance, it may be said that the Greeks were not acquainted with the use of the arch. Spaces were bridged by single slabs of stone. Supporting columns were necessarily near together. Domes and vaulted ceilings were wanting. The prevailing lines, the lines followed by the eye, were horizontal. The earlier temples of Greece, as may be inferred from drawings on ancient vases and references in literature, may have been constructed of wood; but the famous temples, of which at least thirty merit mention as of high rank, were built of marble. The exteriors, especially the cornices and friezes, as we now learn, were richly colored with Tyrian dyes; colored tiling was no doubt employed, and gold was used freely in gilding the statues of the gods within; but the real quality of the Grecian temple consists in a certain purity of form and the sense of proportion that not only delights the eye of the observer, but satisfies his intellect.

In general, the Grecian temple, like that of Egypt, was rectangular, and stood on a platform of stone approached by steps. A covered portico, entirely of marble and supported on marble columns, ran across the front, or in many cases entirely around the building. The temples were built in

three styles, the Doric, the Ionic, and the Corinthian, similar in floor plan and structure, but differing in ornamental details. The Doric temple was the plainest of the three.

The columns, a prominent feature in all the temples, are a distinguishing feature by which the style of architecture may be known at once. Some think the round Egyptian column and the Grecian, as well, are the outgrowth of the pillars of rock left in the early rock-cut or cave temples to support the roof. A square pillar with its corners cut off becomes an octagonal pillar, and is well on its way to become a round column. However that may be, the columns of Doric architecture certainly resemble huge, powerful, shapely, unadorned pine logs, standing on end. They are slightly larger at the lower end, the butt end of the log. Creases or flutings run up and down, suggestive of thick, shaggy bark, and as a further argument in favor of this view, it may be urged that historically the marble column replaces the log prop used, it is believed, in the construction of the earlier temples of Greece. As stated, the Doric column is perfectly plain. A log cut square at each end could not be more so. The capital that forms the tip of the column is a plain stone and the first course of slabs, called the architrave, that rests on the capitals and carries the frieze and the rest of the cornice and roof work, is composed of plain stones without ornament. The frieze or band resting on the architrave is divided into panels, two for each column, by projecting faces, or blocks of stone, called triglyphs from the fact that each is scored by two channels into three vertical fillets. These panels and the gable ends are adorned with sculpture. The Parthenon is admittedly the finest specimen of the Doric order.

The Ionic column may be distinguished by a corded, distinct base, a fluted shaft, and a capital with four corners, each terminating in a spiral projection or volute, bearing a fanciful resemblance to the curling tresses of some goddess. Frieze and gable may be severely plain or they may be adorned with legendary scenes.

The Corinthian order may be identified most readily by the capital. It is carved to resemble upright graceful leaves of which the fillets or ridges of the column are the stalks. In all the orders, the exact diameter, height, and taper of the columns, and their exact distance apart; the thickness of architrave, frieze, and cornice; the suitability of each to all, and the harmonizing of all with the size and dimensions of the whole building, must have been a profound study. The longer modern architects measure and study the relics of Greek art, the greater becomes their respect and admiration for the knowledge and skill of the Greek architect.

The Romans never approached the Greeks in point of beautiful buildings, but excelled them greatly in the magnitude and stability of their public works such as bridges, baths, aqueducts, roads, and famous amphitheaters. By using the principle of the arch, rivers were spanned, trestles for aqueducts were built, lofty domes were reared, and spacious, uninterrupted interiors were rendered possible. The Roman borrowed his ideas of decoration from the Greek; but columns were needed only at the ends of arches; level roofs gave way to vaulted ceilings, and, with the use of short material rectangular ground plans were varied at will. The great amphitheaters were oval. The Pantheon was round. The arch, the dome, the circle, the oval, and the ellipse were added to the world's stock of available architectural knowledge. Some account of the Pantheon, the Colosseum, and the Forum may be found under separate topics.

The architecture of the Middle Ages took the form of churches and tombs. The early Christians developed a form of church from the Roman basilica, frequently with a central circular dome, spanning a square ground plan. The great Cathedral of St. Mark's at Venice is a combination of Roman and eastern architecture known as Byzantine. The spread of the Moslem power was accompanied by a multiplication of mosques, palaces, and tombs. The most wonderful of all Moorish architecture is the Alhambra, of which some account is given under that name.

Out of the round Roman arch grew the pointed arch, somewhat indefinitely known as the Gothic. The famous cathedrals of western Europe are chiefly Gothic. The cathedrals of Notre Dame, Rheims, Rouen, Chartres, Amiens, Strasburg, Cologne, Nuremberg, Munich, Milan, Salisbury, Canterbury, York, and Winchester, as well as Melrose Abbey and Westminster Abbey, are of this class. Their long aisles, flanked by columns and surmounted by vaulted ceilings with pointed arches, all executed, be it remembered, in stone, are wondrously suggestive of avenues and vistas of fine old trees with branches interarching overhead. The lines of the Greek temple carried the eye from side to side in pleased delight. The pointed arches, towers, and spires of the Gothic cathedral conduct the eye upward and give the observer a feeling of awe, of littleness in the presence of limitless height above.

About the beginning of the sixteenth century a movement set in to return to the level and more economical lines of the Grecian styles. This was called the Renaissance, or rebirth, as it were, of classical art. A large number of the fine old town halls and castles of Germany, including the extensive ruins of Heidelberg, are of this indefinite style which shades off into the business blocks of our modern cities.

In America the pueblo dwellings of the Zuni Indians, the temples of the Aztecs, the extensive ruins found in Central America, and the palaces of Peru, all find place in an extended history. They are remarkable and apparently independent developments of the building art; though some see a Chinese influence which they suppose to have been brought across the Pacific by castaway mariners from China, or to have come by way of Bering Strait.

All sorts of architectural ideas have been inherited from Europe. Many of our back streets and country lanes look like bits of the Old World dropped down in America. In Albany old houses present their gables to the street as they do in Holland. In New Orleans the second stories project over the narrow streets as they do in France. In Pennsylvania one may find villages apparently transported bodily from Germany. Still there are certain American types. The log house has an individual identity. The colonial house, most frequently seen in Virginia and the South, may be recognized by a lofty front portico with pillars. The English country house is reproduced in the White House at Washington. The John Hancock house of Boston, the brownstone front of New York, and the box-like frame house with its L or lean-to are other types.

For large buildings steel construction now prevails in American architecture, which leads the world in this respect. The development of this form of construction in our large cities is due, first, to the rapidly increasing value of real estate, which makes tall buildings desirable, and second, to the necessity for rapid completion of all building enterprises, in order to secure early returns on the capital invested. With foundations usually carried down to bedrock, steel frame construction is used for buildings twenty, thirty, and even fifty stories in height; and the lower floors may be occupied by tenants long before the upper stories are completed. In some cities the height of such buildings is limited by ordinance, but their safety and utility having been proved by experience the tendency is to remove such restrictions.

In modern steel construction, the foundation is of the utmost importance and involves the most careful engineering design. In the case of large and heavy buildings, the foundations are usually laid by concerns that make a specialty of such work, employing various methods to suit different soils and the total estimated weight per square foot of the proposed building with its contents. In soft soils, piles are driven deep; in others, wide platforms of concrete, or of steel rails imbedded in cement, inverted arches, or concrete piles are used, and occasionally it is necessary to sink pneumatic caissons through quicksand to reach a solid bottom. The work of excavation and laying a satisfactory foundation often takes longer than the erection of the steel superstructure. Hollow steel piles, driven to bedrock, cleaned out by compressed air, and then filled with con-

ARCTIC ANIMALS

1. Polar Bear. 2. Wolverine. 3. Blue Fox 4. Arctic Hare. 5. Lemming. 6. Reindeer. 7. Musk Ox. 8. Walrus. 9. Seal. 10. Sea Otter. 11. Greenland Whale. 12. Norwhal. 13. Ptarmigan. 14. Snowy Owl. 15. Eider Drake. 16. Eider Duck. 17. Razor-bill. 18. Arctic Gull.

NORTH TEMPERATE ANIMALS

1. Raccoon. 2. Porcupine. 3. Mountain Sheep. 4. Alpine Goat. 5. Pronghorn. 6. Bison. 7. Prairie Dog. 8. Grizzly Bear. 9. Skunk. 10. Vulture. 11. Mocking-Bird. 12. Bluebird. 13. Hummingbird. 14. Wild Turkey. 15. Prairie Chicken. 16. Rattlesnake. 17. Moccasin. 18. Horned Toad. 19 Eel Lizard 20 Axolotl.

crete, are frequently used for the foundation when possible.

The steel-pile foundation has made steel buildings possible in many places where it would have been unprofitable to lay any other kind of foundation. Where water is encountered by the builder at a depth of many feet from the surface, the steel pile can be driven through the stream to rock bottom without any difficulty, and this method is also much less expensive than other forms of securing a foundation for large buildings, especially the old open-pit method. The load capacity of a steel pile is also an important consideration in modern building. One hundred tons can be safely carried on a single 12-inch steel pile, and in heavy buildings the foundations may consist of piers containing sixteen steel piles each, capable of sustaining a load up to 1,300 tons. Experience also shows that steel pile foundations are durable, with little or no oxidation (rust) after many years of service.

In steel construction, a skeleton or frame of steel is set upon and securely bolted to the foundations. This framework consists of continuous vertical posts or supports of wrought iron or steel, erected at suitable intervals of from 10 to 16 feet, according to the building plans, with horizontal girders connecting them at each story. All these members of the structure are rigidly bolted or riveted together, and diagonal braces of steel are inserted to resist side strains and wind pressure. The result, before the brick masonry or other outer skin of the building is applied, presents the appearance of a huge rectangular cage, sometimes towering above the ground to a height that gave the original buildings of this character the name of "skyscrapers." This steel skeleton supports all the loads and strains of the building when it is completed. The exterior walls, sometimes of cut stone, sometimes of fireproof brick, often of stone below and brick above, and occasionally of glazed tile, are carried by the framework, each story having its own independent outer wall, supported on a metal shelf which forms part of the girder of next story. The structural iron or steel comes to the building site with every column and beam of proper size and shape for its place in the structure, and suitably marked, so that there is no delay in setting up the frame, and the bolting and riveting of the steel is accomplished by the aid of pneumatic hammers with a speed that appears like magic to the inexperienced eye. The men who do the work at dizzy heights above street levels constitute a body of specially trained artisans, organized into a distinct trade. The walls of the building can be erected without the aid of special scaffoldings, for the masonry or brickwork can be laid from the inside of each story, the steelwork furnishing the necessary shelf or platform for each successive operation. Thus a building of twenty or thirty stories can be erected and covered in within a period of a few months; and as stated the lower floors may be occupied by tenants and rentals begin to accrue long before the upper stories receive their interior finish.

Without steel construction the modern city in America would be impossible, for it is only by the employment of the steel frame that great cities such as New York, Chicago and others can be expanded upward.

Arctic Regions, a term applied to that part of the world, both land and water, situated within, that is to say north of, the Arctic Circle. Instead of coming to a slight peak, as one might imagine from maps, the north pole at the center of this region is really the most flattened portion of the earth's surface, more so than the south pole, as there are no snowfields in the extreme north. The Arctic Circle is everywhere 23° 68′ or 1,408 geographic miles from the north pole. The diameter of the Arctic region is, therefore, 2,816 miles, and its area, counting land and water, is 8,201,883 square miles, or more than twice that of the United States. The circle is 8,640 miles long, rather more than a third as long as the equator. About four-fifths of the Arctic Circle may be traced on land. Three passages of water lead into the Arctic Ocean. The widest separates Greenland from Norway; the second lies between Greenland and the continent of North America; the third

Bering Sea and Strait, separates Alaska from Asia. The Arctic coast is for the most part low and comparatively level. Dreary tundras, the most inhospitable regions in the world, stretch along the sea. The coasts of Norway and Lapland are important exceptions.

In Europe forests of pine trees and larch extend beyond the Arctic Circle. Dwarf birches and low, matted willows are found still farther north. The arctic poppy and other flowering plants are not without beauty. Vast tracts of land are frozen to a depth of two or three hundred feet. The surface thaws out a foot or two in the short summer and produces millions of acres of the lichen on which the reindeer and musk ox feed. The polar bear lives more on sea than on land. Fishing birds of many kinds, gulls, little auks, kittiwakes, guillemots, and fulmars, are found on rocky coasts. The eider duck and other swimming birds nest on the coast.

A belt of shallow water encircles the Arctic Ocean. It is thought that the northern coast of Europe, Asia, and America has sunk beneath the sea, and that the islands, such as Spitzbergen and Franz Josef Land, are the tips of former elevations. Vast stretches of this submarine plateau are no more than 300 or 1,000 feet below the sea. During the greater part of the year, the larger part of these waters are ice bound. The width of the plateau has not been definitely determined, but it is known that the center of the Arctic Ocean about the north pole is deep and that it is warmer in midwinter than the shallow margin we have been describing.

Arctic waters are said to be of exceeding clearness, with beautiful ultramarine and olive green tints. The margin of the Arctic Ocean is inhabitated by numerous species of fishes, the food of various seals; the walrus is found on the banks, digging for clams. A species of codfish is pursued far into the interior ocean by the polar shark. The right whale, or Greenland whale, was formerly abundant in the shallow polar seas, but it has been sadly reduced in number by the persistent whalers of New Bedford.

The central deep Arctic Sea seems to contain but little life. It is so densely packed with broken ice that ships have not been able to penetrate it. It is said to be free from the violent storms of the tropics, yet changes of winds fling the floating ice into long windrows like ranges of hills. A strongly built ship, abandoned in one edge of the ice packs, has drifted through and emerged on the other side. For some account of the ship Fram and her crew, the reader is referred to an article on Captain Nansen.

Aside from its depth, one reason for the open polar sea is the constant circulation of waters. Along the east side of each of the three passages opening into southern waters, a stream of warm water runs in; and currents of cold water run out along the western sides, carrying floe ice and icebergs far to the southward. To the greatest of the warm streams, a continuation of the Gulf Stream, the moderate climate of Arctic Norway, and the vegetation of Lapland is due. In fact, the coldest parts of the Arctic regions are by no means the nearest the north pole. Central Greenland, Northeast Siberia, and the vicinity of the Perry Islands, north of North America, are considered the coldest localities. The greatest natural cold ever actually registered on a thermometer was ninety below zero, —90° F., north of Yakutsk, only fifty miles north of the Arctic Circle. The lowest temperature ever noted in the central polar sea was —63° F.

One railway enters the north frigid zone. It runs from a point on the Gulf of Bothnia in Sweden to Afoten fiord on the coast of Norway. It was built to reach the famous Swedish iron ores of Malmberg. In the summer there is a regular tourist service to the "Land of the Midnight Sun." The engineer blows his whistle as the train crosses the Arctic Circle.

During the past century, 200 ships and 4,000 lives have been lost in Arctic waters. It is estimated that the vast sum of $100,000,000 has been expended in Arctic voyages. Exploration of the Arctic Sea has been carried on largely by dog trains, traveling on the drifting, breaking fields of ice. In 1896 Nansen, a Norwegian

THE ENDS OF THE EARTH DISCOVERED

"STARS AND STRIPES NAILED TO NORTH POLE."

North Pole reached by Rear-Admiral Robert E. Peary, April 6, 1909.

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NORWEGIAN FLAG AT THE SOUTH POLE.

South Pole reached by Captain Roald Amundsen, December 17, 1911.

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LIEUT. ROBERT E. PEARY

In His Suit of Furs on the Deck of The Roosevelt

explorer, reached a point in 86° 14′, north of Franz Josef Land. In 1901, Abruzzi, an Italian, attained 86° 33′. In 1906 Robert Peary, an American, forced his way to 87° 6′ north, 201 miles from the pole.

In 1909 Frederic A. Cook announced that he had planted the American flag at the north pole April 21, 1908. A few days later a telegram arrived from Commander Peary, stating that there was no foundation for Cook's assertion, and that he, Peary, had discovered the north pole. The American Geographical Society thereupon passed upon Peary's claim, with the result that he was awarded a gold medal. He confirmed the theory of an open polar sea.

The following is a record of the principal polar quests:

Year.	Explorer.	Latitude Reached.	Miles from Pole.
1588	John Davis	72:12	1,235
1594	William Barents	77:20	879
1596	Rup Heemskerck	79:49	706
1607	Henrick Hudson	80:23	667
1616	William Baffin	77:45	861
1806	Wm. Scoresby	81:30	587
1827	W. E. Parry	82:45	503
1854	E. K. Kane	80:10	682
1868	Nordenskjold	81:42	573
1870	C. F. Hall	82:11	542
1874	Julius Payer	82:05	549
1876	G. S. Nares	83:20	463
1879	Geo. De Long	77:36	871
1882	A. W. Greely	83:24	458
1896	Frithjof Nansen	86:14	261
1897	Walter Wellman	81:35	555
1897	Duke De Abruzzi	86:33	238
1906	Robert E. Peary	87:06	201
1909	Robert E. Peary	90:00	000

See ANTARCTIC; AMUNDSEN; HUDSON; KANE; NORDENSKJOLD; DE LONG; FRANKLIN; GREELY; NANSEN; PEARY.

Arcturus, ärk-tū′rus, as supposed by many astronomers, the nearest of the stars. It is situated in the constellation Boötes in the northern heavens. It shines with a red light. It is supposed to be a body like our own sun. It is evidently moving southward slowly through the heavens. It has moved a degree since the days of Ptolemy. It is thought by Professor C. A. Young that "Arcturus gives the earth as much heat as would be received from a standard candle 5.8 miles away." One writer hazards the statement that Arcturus is 1,500,000 times as far away as the sun, that it has a diameter of 71,000,000 miles, and that its bulk is 551,000 times that of the sun. See STAR.

Canst thou guide Arcturus with his sons?—Job xxxviii:32.

Arden, Forest of, the largest forest in early Britain. It lay chiefly in modern Warwickshire. The scene of Shakespeare's play of *As You Like It* is laid in the forest of Arden, which, however, was but a fragment of the forest of old.

Ardennes, Forest of, an extensive forest of Gaul. In Caesar's time it occupied the lower plains of the Rhine. Some writers say that it extended to the North Sea. The name is still retained by the French department of Ardennes. Portions of the forest still remain in Ardennes, Luxemburg, and Belgium. In *Quentin Durward* Walter Scott, it may be remembered, calls William de la Marck "the Wild Boar of Ardennes." The name, in a somewhat shortened form, recurred in England in the Arden Forest of Warwickshire.

Ardmore, Okla., the county seat of Carter Co., is 100 miles south of Oklahoma City, and is entered by 4 important railroads. Since early in its history, Ardmore has been an important cotton market, and for a time maintained the record of being the greatest inland cotton market in the world. Asphalt mining and oil refining are the two other chief industries. Owing to its location immediately south of the Arbuckle mountains, the city has a milder climate than have cities in the northern part of the state. It contains high and graded schools, two academies, an Indian school for girls, and a public library. Population, 1920, 14,181.

Areop′agus, in ancient Athens, a venerable council of wise men, taking its name from a hill on which it was wont to meet. Its meetings were held in the open air. It appears originally to have been a meeting of petty chieftains, or clan elders. At its best, it appears to have had a well filled treasury and to have been a sort of supreme court, exercising power of life and death, and having authority to guard the morals of Attica. Its functions and membership were amended by Solon. It gradually declined. See ATHENS.

Ares, the Greek god of war, identified with the Latin Mars. See MARS.

Arethusa, ăr-e-thū′sȧ, in Grecian mythology, a beautiful nymph. A river god of the Olympian region became enamored of her, and she prayed to Diana, who opened a subterranean passage for her under the sea to Ortygia, Sicily, whither, however, the river god pursued her. The basis for the legend is the fact that the river Alpheus passes underground repeatedly, and reappears again in the limestone rocks of Arcadia. A beautiful fountain gushes forth in Sicily. The imagination of the Greeks supplied the rest of the story. The name of this sea nymph has been bestowed upon one of our most beautiful flowers. It is found in swamps from Newfoundland to Minnesota and southward to the mountains of North Carolina.

Our Arethusa is one of the prettiest of the orchids, and has been pursued through many a marsh and quaking bog by her lovers. She is a bright pink-purple flower an inch or more long, with the odor of sweet violets. The sepals and petals rise up and arch over the column, which we may call the heart of the flower, as if shielding it.—Burroughs, *Riverby.*

Argand, Amié, a Swiss physician and chemist. Born at Geneva about the middle of the eighteenth century. Died 1803. He is noted as the inventor of the Argand lamp. The use of the old-fashioned round wick was always attended with smoke and more or less of foul smell, owing to an imperfect combustion of the carbon in the oil. A flat wick is a great improvement upon the round one, as it enables more air to reach the flame. Argand conceived the plan of circular wicks shaped like a hollow cylinder, admitting air to the flame on the inside as well. He also patented an invention for a slow feed from a reservoir, thus keeping the surface of the oil at the same level. The French Revolution annulled his patents from which he appears to have received little profit, but a great deal of annoyance. See LAMP.

Argentina, är′jĕn-tī′na, or **Argentine Republic,** a country of South America. The name is Spanish from the Latin *argentum,* meaning silver.

HISTORY. The history of the country is in many respects that of our original thirteen states. At first a Spanish settlement on the west bank of the La Plata, it had its full share of trouble with Indians. Settlements were wiped out by midnight attacks, and tribes were exterminated. In common with other South American states, Argentina extended and prospered as a colony of Spain. The settlers engaged largely in the raising of cattle. With growing strength, Argentina incited its neighbors to join in a revolutionary war that lasted for seven years. July 9, 1816, a declaration of independence was issued, and Argentina ceased to be a province of Spain. In 1853 a constitution modeled on that of the United States was adopted. The president and vice-president hold office for six years and senators are chosen for a term of nine years. The republic consists of fourteen states and ten territories. Buenos Ayres is the capital. Spanish is the official language. Catholicism is the national religion.

In 1892 a long standing boundary dispute with Chili was settled. Several times the controversy nearly led the countries into war, and on the boundary on the crest of the Andes, a large statue, *The Christ of the Andes,* was erected to commemorate a lasting peace.

EXTENT OF TERRITORY. The original boundaries have been extended northward and southward, until Argentina now includes that part of South America, lying east of the Andes as far as the La Plata, from Bolivia to Darwin Sound. Patagonia no longer appears on a map as a no man's land, having been divided—rocks, ice, penguins, Patagonians, and all—between Argentina and Chile. The extreme width of the republic is 1,000 miles. From the southern boundary to the northern is a distance of 2,000 miles. The total area is 1,153,119 square miles, far exceeding that of our Atlantic States.

CLIMATE. The range of climate and variety of productions are even greater than is the case on our Atlantic coast. The northeast portion of Argentina lies low, and is no farther from the equator than is Florida. Cotton, olives, figs, lemons, oranges, grapes, tobacco, sugar-cane, and

orchard fruits are produced in abundance.

In 1920, Argentina was the world's largest exporter of linseed and corn, and was third in wheat exports.

MINERALS. The eastern slope of the Andes, from the Strait of Magellan northward to Bolivia, contains mineral wealth, —gold, silver, copper, lead, iron, bismuth, borate of lime, salt, coal and petroleum, mecury, marble, and asphalt.

AGRICULTURE. In disposing of public lands, Argentina has been more liberal even than the United States. In addition to free homestead grants, the government has loaned the settler $1,000 for the purchase of a team, implements, stock, and seed, to be repaid in five years. Vast districts are devoted to grazing. Butter, beef, tallow, hides, and leather are produced in enormous quantities and are sold largely to England. Argentina has advanced very rapidly as a grain growing and stock raising country; in the production of wheat and beef cattle she now takes high rank among the nations. There are 250,000,000 acres of land in the country that are ideal for the raising of cattle. The government holds tracts of land suitable for pastoral colonization that total 237,768,000 acres in area, and these lands are conditionally offered free.

COMMERCE. Being in the southern hemisphere, the spring season comes at the time of our autumn, summer at the time of our winter. The wheat harvest falls in January, and the new wheat is thrown on the market at a time when northern fields are covered with snow. Argentina has so much produce to sell, timber, minerals, products of the stock ranges, fruits, and grains, that, although the merchants of that country buy over $400,000,000 worth of cloth, paper, beverages, chemicals, and pottery abroad, there is still at the end of the year $60,000,000 coming to them from foreign countries. About one-tenth of this business is done with the United States. They buy petroleum oil and agricultural implements and many other articles of us, and sell us a good share of the hides and leather that go into the shoe factories of Lynn and other New England towns.

The population of Argentina is steadily increasing, and continual extension of her railroads, and telephone and telegraph lines serves to secure her economic integrity.

A system of free public schools and normal schools has been established with care, the latter partly under the direction of instructors obtained from the United States. Manufactures are getting under way. The republic has the resources, the thrift, and the intelligent public spirit that insures national greatness. It is destined to be the second country of the New World.

STATISTICS. The following statistics are the latest from trustworthy sources:

Land area, square miles	1,153,119
Forest area, acres	96,250,000
Irrigated area, acres	10,000,000
Population (1921)	8,698,516
Immigrants (1920)	188,688
Emigrants (1920)	148,907
Chief Cities:	
Buenos Ayres	1,674,000
Rosario	222,592
Cordoba	156,000
Tucuman	91,216
La Plata	90,436
Santa Fe	59,574
Mendoza	58,790
Bahia Blanca	44,143
Number of provinces	14
Members of state senate	30
Members of house of representatives	120
National revenue	$205,000,000
National indebtedness	$642,622,450
Farm area, acres	250,000,000
Improved land, acres	62,500,000
Wheat, bushels	169,756,000
Oats, bushels	47,606,000
Corn, bushels	230,423,000
Wool, pounds	300,000,000
Flax seed, bushels	42,038,000
Barley, bushels	11,161,000
Sugar cane, short tons	230,990
Domestic Animals:	
Cattle	27,392,126
Horses	9,366,455
Asses	565,069
Sheep	45,303,419
Goats	4,670,130
Swine	3,227,346
Imports	$367,000,000
Exports	$531,000,000
Industrial establishments	48,779
Capital invested	$893,831,000
Operatives	410,201
Miles of railway	21,858
Teachers in public schools	37,895
Pupils enrolled	1,201,273

See BUENOS AYRES.

Argo. See ARGONAUTS.

Argon, ăr′gŏn, an element in the air discovered in 1894 by Professors Strutt (Lord Rayleigh) and Ramsay of England. A hundred years earlier Cavendish suggested the existence of such a gas. The discoverers of argon were led to the new element by noticing that nitrogen obtained from air was always heavier by one-half of one per cent than that prepared from compounds. Investigation proved that atmospheric nitrogen had mixed with it an element new to science. On further investigation of argon obtained from liquid air, it has been found that argon is associated with minute quantities of yet other unsuspected elements. Under ordinary conditions, argon is an odorless, tasteless, colorless gas. Argon liquefies under a pressure of 40 atmospheres at a temperature of —184° F., and freezes at —310° F. As a liquid it is denser than water. Little is known of argon's chemical properties save that it is inert and does not combine with any other element. See AIR.

Argonne Forest. See WAR, THE GREAT.

Argonauts, in the legends of Greece, a band of Greek adventurers. They were so called from their ship, Argo, in which they sailed from Iolcos in Thessaly to distant Colchis, somewhere on the unknown shores of the Black Sea. Jason, the leader of the expedition, associated with himself fifty daring spirits of his neighborhood, including Hercules, Castor and Pollux, Orpheus, Telamon, Theseus, and others. Their errand was to bring home the golden fleece which hung in a consecrated grove at Colchis, guarded by a dragon. Their numerous adventures would fill quite a volume if related in detail. Pollux distinguished himself in a boxing contest in which he overpowered King Amycus and bound him to a tree. Two of the party slew the harpies that polluted the food of the blinded and aged king Phineas, who, in return, told the way to Colchis. They had to go between the cliffs that had an inconvenient habit of closing up and crushing whoever sought to pass. This passage the band accomplished by sending a dove in advance. Orpheus played his most entrancing tunes on a lyre, while the others rowed with all their might. The rocks were so enchanted that they stood firm on their base, unable to move until the party had escaped. Arriving finally at Colchis, Jason, the leader, found a friend in Medea, the daughter of King Aetes. The king agreed to deliver up the golden fleece on condition that Jason should perform three dangerous labors. First, he was required to yoke to a plow two fire-breathing bulls with hoofs of brass, and to plow the field of Mars. Next, he sowed the field with dragons' teeth from which armed men sprang up. These he overcame one by one. Medea assisted him with the third task by giving the dragon a soothing draught. Jason slew the dragon, received the fleece, and set out on his return, accompanied, it is needless to say, by the princess. After various additional adventures, including the escape from her father, who pursued the retreating band, the Argonauts returned safely home.

It has been suggested that some commercial enterprise, possibly an expedition to open a new avenue of commerce, possibly to meet the caravans of Asia, may be at the foundation of the legend. The term argonauts has been applied since to various bodies of adventurers, especially to the "Argonauts of '49," or "The Forty-niners," the early seekers of gold in California.

Argus, in Greek legend, a giant having a hundred eyes. Hera noticed one day that it had grown suddenly dark. She at once suspected that Zeus, her husband, was trying to conceal something from her view. She, therefore, blew away the cloud and found Zeus with a beautiful white heifer standing beside him. Hera was right in her suspicions. Zeus had been making love to Io, daughter of Inachus, the river god, and on his wife's approach had changed Io into a heifer. The wise Hera asked Zeus to give the heifer to her, and he could not well refuse. Lest Io be returned to mortal shape, Hera set the hundred-eyed Argus to watch her. For a time all went well, for Argus could sleep with some of his eyes open, and so never lost sight of his charge. But Io was unhappy. Zeus pitied her and sent Mercury to her aid.

Mercury sat beside the giant, told long stories, and played the most soothing melodies upon his Pandean pipes. At last the hundred eyes were closed. With one stroke, Mercury cut off the giant's head. Hera took the hundred bright eyes and with them ornamented the tail of her peacock, where they may be seen this day. According to the theory that all myths are symbolical, Io of this legend has been interpreted to represent the moon, and the eyes of Argus are the stars, keeping ceaseless watch over her. The name Argus is often used to designate an observant or keen-sighted person. It is also a favorite name for a newspaper, implying that the editor has ever an eye open to the public good. See Io; HERA.

Argyll, John Douglas Sutherland, ninth Duke of (1845-1914), an English statesman and author. He is best known as the Marquis of Lorne. Born in London, he was educated at Eton, St. Andrews University, and Trinity College, Cambridge. In 1868, Argyll was sent to Parliament as a Liberal from Argyllshire, which he represented until 1878. In 1871, he married Louise, the fourth daughter of Queen Victoria. From 1878 to 1883, he was Governor-General of Canada, and his administration was extremely popular and successful. Argyll served again in Parliament from 1895 to 1900, this time as a Unionist. He wrote poetry, travel sketches and books on Scottish social history. His principal works are *A Trip to the Tropics, Imperial Federation, Canadian Pictures, Life of Queen Victoria, Pages From the Past,* and *Yesterday and Today in Canada,* and *Canada,* a National Hymn.

Ariadne, ăr-ĭ-ăd′nē, in Greek mythology, the daughter of Minos, king of Crete. The story runs that she fell in love with Theseus who had come from Athens to destroy the Minotaur. Ariadne gave Theseus a sword with which to slay the Minotaur, and a silken thread as a clue to guide him out of the labyrinth when the monster should be killed. Theseus was successful in his undertaking, and the two fled from Crete. Theseus, however, was warned by Minerva that Ariadne was not to be his wife. He therefore abandoned her while sleeping on the island of Naxos. Ariadne awoke to find herself deserted. While bewailing her sorry fate, she was found by the god Bacchus, who straightway made her his wife. He gave her a crown studded with gems as a wedding gift. On her death, the god threw this crown into the sky, where the gems still shine in a constellation known as the Northern Crown. Ariadne sleeping on the isle of Naxos furnishes the subject for one of the finest pieces of sculpture in Italy. It is spoken of as the Ariadne of the Vatican. The scene where Ariadne holds the thread to guide Theseus out of the labyrinth appears on a very early vase preserved in the British Museum.

Arianism, in theology, the doctrines of Arius and his school. Arius was presbyter of the church of Alexandria in the fourth century. He was a unitarian, holding that Christ, the Son, was created by the Father and was subordinate to Him, though possessing a similar nature. The doctrine of Arius was condemned by the church at the Council of Nice, A. D. 325, which decreed that Christ was "of one substance with the Father." The views of Arius were disseminated by fugitive Arians, and became the national religion of the Goths, Vandals, Suevi, and Longobardi, but these churches were gradually received within the Catholic church, and the Arians as a sect faded away. See NICE.

Ariel, ā′rĭ-el, as popularly known, a tricksy spirit in Shakespeare's *Tempest.* There seem to be several Ariels. In its Hebrew origin, the word signifies Lion of God. In the Old Testament, it is used both as an epithet and as a proper name. In the book of Isaiah, the name is given to Jerusalem. In Milton's *Paradise Lost,* Ariel is one of the fallen angels. In Pope's *Rape of the Lock,* Ariel is a sylph, the guardian of Belinda. In medieval legends, Ariel was a spirit of the air, the guardian of innocence. Shakespeare's Ariel is the messenger of Prospero. He becomes invisible at will, or assumes any desired shape in the service of his master. Prospero applies many epithets to him.

He calls him "delicate," "dainty," "quaint," "tricksy," a "brave spirit," "my spirit," a "minister of Fate," "my industrious servant." But Ariel loves liberty. "My Liberty, my Liberty," he cries. Being denied he becomes "moody," and Prospero calls him a "malignant thing," though again confessing that he loves him "dearly."

TWO OF ARIEL'S SONGS.

Full fathom five thy father lies;
Of his bones are coral made;
Those are pearls that were his eyes:
Nothing of him that doth fade,
But doth suffer a sea-change
Into something rich and strange.
Sea-nymphs hourly ring his knell:
Ding-dong.
Hark! now I hear them,—Ding-dong, bell.

Where the bee sucks, there suck I:
In a cowslip's bell I lie;
There I couch when owls do cry.
On the bat's back I do fly
After summer merrily.
Merrily, merrily shall I live now
Under the blossom that hangs on the bough.

Ariel is one of the most charming creations in the whole Shakespearian gallery. He is a creature all compact of grace and beauty. He is nimble and agile like the wind. To him, as to Puck, it would be nought "to put a girdle round about the earth in forty minutes."—Smeaton.

Arion, a-rī′on, a Greek poet who flourished about 700 B. C. He was a native of Lesbos, but belonged rather to the Dorian school of poets. Arion dwelt for the most part at the court of Periander, king of Corinth. He was regarded by the ancients as the inventor of the dithyrambic meter. It is certain that he was the first to give finished form to the dithyramb, or choral hymn to Dionysus. Certain traditions are attached to the name of Arion. The most noted is told in an ancient fragmentary poem, said to have been written by Arion himself. The story runs that Arion wished to enter a musical contest in Sicily. Periander tried to dissuade him, but Arion decided to compete. He went to Sicily, won the prize, and embarked with his wealth for Corinth. During the voyage he was warned by Apollo in a dream that the crew intended to slay him for his treasure. He laid his plans and, when they were about to attack him, he requested the privilege of singing his death song. This was granted, for some of the crew had a desire to hear so great a poet and musician. Arion sang a beautiful song to the music of his lyre, and immediately leaped into the sea. The sailors supposed him drowned, but one of the dolphins who had been drawn by the music to approach the ship bore him safely to the shore. Arion bade his rescuer farewell and proceeded joyfully to the court of Periander. He arrived in the king's presence before the ship landed, and was thus able to confound the crew when they told Periander that they had left Arion safe and well in Tarentum, or, according to some accounts, that he was dead. Arion's lyre and the dolphin were placed among the stars, while the sailors were put to death. This story has been told by the ancient poets with many embellishments, and Arion's name is often mentioned by more modern writers. Says George Eliot:

Arion whose melodic soul
Taught the dithyramb to roll.

Meantime some rude Arion's restless hand
Wakes the brisk harmony that sailors love;
A circle there of merry listeners stand,
Or to some well-known measure featly move
Thoughtless, as if on shore they still were free to rove.
—Byron.

Ariosto (1474-1533), one of the great poets of Italy. He was a native of Reggio, Lombardy, and was bred to the law, but left it for poetry. He appears to have attached himself first to a cardinal, from whom he had a small pension, and later to the Duke of Ferrara. In Ferrara city, he built a modest home and devoted his abundant leisure to the production of poems, many of them in the Latin tongue. His chief work, however, and the one on which his fame rests, is a highly imaginative Italian romance in verse entitled *Orlando Furioso.* It is drawn from Arabian sources. It consists chiefly of a series of tales and fantastic adventures strung together with the love affairs of Ruggero and Bradamante, with whose happy marriage, as should ever be the case, the story ends. "Nature made him and then broke the mold," is a translation from Canto X, Stanza 84, of this poem.

Aristides, ar-is-tī′des, surnamed "the Just," a citizen of Athens. He came into

prominence at the battle of Marathon, 490 B. C., where he, with nine others, was appointed to lead the Athenian army, each taking command for a day. Aristides persuaded his companions to devolve the entire command upon Miltiades, in whose military genius they had the greatest confidence. The overwhelming defeat of the Persians proved the wisdom of this advice. We next hear of Aristides as opposing the plans of Themistocles for building ships. According to a law of Athens, any citizen might be banished for ten years by popular vote. Themistocles moved accordingly for the ostracism of Aristides. During the voting an illiterate fellow, who did not know Aristides, came up to him and asked him to write his name on the piece of pottery used as a ballot. Aristides asked the voter whether Aristides had injured him. "No," said the voter, "but I am weary of hearing him called Aristides the Just," and thereupon, so runs the story, Aristides wrote his own name on the ballot and retired to the island of Aegina. Later he returned to his native shore in time to render Themistocles valuable assistance in the battle of Salamis, and was thereupon restored to popular favor. This account of Aristides would not be complete without the story of his further relations with Themistocles. The latter, having announced that he had a plan to propose which could not be confided to a popular assembly, Aristides was appointed on a committee of three to inquire into the plan. Having ascertained that it contemplated a treacherous burning of all the ships of the rival Greek cities, then lying at harbor, Aristides reported that the plan proposed was very advantageous, but dishonorable; whereupon it was rejected without inquiry into its details. He died about 468 B. C. See THEMISTOCLES.

Aristophanes, ar′is-tŏph′a-nēs (448-380 B. C.), the greatest comic poet of Greece. He is credited with having written fifty-four comedies, eleven of which are still extant. They were acted in public, and were a sort of "take-off" or running commentary on public life. They throw light on Athenian manners and customs. *The Acharnians* seeks to strengthen sentiment for peace with the Spartans. An honest countryman sends to Sparta for a sample of the proposed peace, and likes the taste so well that he concludes a treaty for himself and family. *The Knights* attacks the demagogues of the city, who are likened to rascally stewards. *The Clouds* assails the professed teachers of rhetoric, Socrates in particular. An indignant father, whose son has turned out both dishonest and impious, proposes to burn both the philosopher and his school. *The Wasps* is directed against the Athenian love of lawsuits. A house dog, having stolen a cheese, is tried by his master for the offense. Through a love for the formalities of law, the old man makes egregious blunders which result in the ludicrous acquittal of the dog. In *The Birds,* the birds are persuaded to build a city in mid-air, so as to cut off the gods from man. Other plays as *The Frogs, The Banqueters, The Merchantmen, The Storks,* etc., are of a similar nature. *Peace* celebrates quiet and country life. A distressed Athenian sails up into the sky on a beetle's back; he finds the gods busy pounding the Greek states in a mortar; he releases Peace from a well in which she is confined, induces the gods to lay aside pestle and mortar and concludes by marrying a handmaid of Peace. In *The Knights,* the following conversation occurs between a sausage-seller and a leading demagogue:

S. S. Are there any means of making a great man
Of a sausage-selling fellow such as I?
Dem. The very means you have must make you so.
Low breeding, vulgar birth, and impudence,—
These, these must make ye what ye're meant to be.
Tell me truly: are ye allied
To the families of the gentry?
S. S. Naugh, not I;
I'm come from a common, ordinary kindred,
Of the lower order.
Dem. What a happiness!
What a footing will it give ye! What a groundwork
For confidence and favor at your outset!
S. S. But bless ye! Only consider my education!
I can but barely read,—in a kind of a way.
Dem. That makes against ye!—The only thing against ye,—
The being able to read in any way.

Aristotle (384-322 B. C.), a Grecian philosopher. He was the son of a Macedonian physician, but was early left an orphan. He went to Athens at the age of eighteen to study with Plato. He remained under this great teacher for twenty years, and was called the intellect of the school. Philip of Macedon had ambition for his son who afterward became Alexander the Great, and invited Aristotle to become his boy's tutor. Three years later Philip died and Alexander came to the throne at the age of twenty. Aristotle returned to Athens and opened a school of his own. Here he taught with great success until, on the death of Alexander, he retired to Euboea, where he died. Alexander is said to have sent Aristotle information gathered in his travels and wars, probably concerning new and curious plants, animals, shells, and the like.

Aristotle wrote a large number of learned treatises. Scientific men declare that his was the greatest intellect that Greece produced. Goethe once said that if he could have an opportunity to live his life again he would devote it to a study of nature and Aristotle, adding, "It is beyond all conception what that man saw." His various treatises constitute a sort of encyclopedia of Greek knowledge. Out of forty titles a few may be named as indicating the scope of his writings: *Art of Rhetoric, Politics, Art of Poetry, On the Heavens, Researches about Animals, On the Soul, On Sleep and Waking, On Dreams, On Youth and Old Age, On Parts of Animals, On Locomotion of Animals*, etc.

In political matters Aristotle favored a large middle class, and thought that government should be in the hands of ordinary average people, for neither the very rich nor the very poor, the very strong nor the very weak, the very noble nor the very mean are readily induced to hear reason. The one extreme is supercilious, the other is rascally. One extreme sins from insolence, the other from villainy. In ethics he taught that happiness consisted in working out one's inward desires, and that every virtue is a golden mean between two vices.

Aristotle introduced the term, four-footed, in the study of animals. He described about 150 birds, 20 reptiles, 116 fishes, 60 insects and spiders, 24 crayfish and worms, and 40 clams, oysters, and radiates. His work in natural history was not improved for two thousand years.

Aristotle is also called the Father of Logic. His use of the syllogism is still the basis of modern instruction as:

All men are mortal;
Socrates is a man;
Therefore Socrates is mortal.

Arithmetic, the art of computation, the most elementary branch of mathematics. The system of arithmetic in use among enlightened nations is usually known as the Arabic, but it should be called the Hindu arithmetic. While the subject of elementary geometry, with some indebtedness to the Egyptians and to the Phoenicians, is essentially a product of the Grecian, that is to say, of a European mind, our present system of elementary arithmetic was brought almost to its present degree of development by a kindred race in the fertile valleys of India. Several volumes of early Hindu learning have preserved a record of their arithmetic. The following problem from the Ganges is couched in the flowery language of the East. It dates about the year 500, a period when the Angles and Saxons were just getting the upper hand in the fens of eastern England.

Beautiful maiden with beaming eyes, tell me, as thou understandest the right method of inversion, which is the number which multiplied by 3, then increased by ¾ of the product, divided by 7, diminished by ⅓ of the quotient, multiplied by itself, diminished by 52, the square root extracted, addition of 8, and division by 10, gives the number 2?

Many other Hindu problems have been handed down implying a knowledge of interest, discount, partnership, alligation, arithmetical and geometrical series, and many curious methods for the solution of numerical puzzles.

The sudden rise of the Moslem power in Arabia and its rapid expansion until it extended from India to the Pyrenees is phenomenal. Haroun-al-Raschid, the Charlemagne of the Arabians, drew learned men from all directions to his court

at Bagdad. These men taught the Arabians the mathematics of the West and of the East, the geometry of Greece and the arithmetic of India. This learning the Arabs carried along the northern coast of Africa into Spain, where they founded noted schools and universities at Cordova and elsewhere. European students, attracted by the fame of the Moslem universities, resorted thither in disguise, it is said, and brought away a knowledge of the so-called Arabian arithmetic. It is supposed also that the merchants of southern Europe, dealing with Saracenic customers, obtained a practical knowledge of the mercantile arithmetic employed by the Arabian merchants. And so our school arithmetic in all its essential features originated, so far as we know, among the Brahmins in the valley of the Ganges. It was carried by learned Hindus to Bagdad, it traveled thence to Spain, escaped to the early European universities or gained a footing among the Italian merchants, reached England, and, finally, was brought over to this country by English colonists with English textbooks.

Arithmetic, however, as well as other branches of mathematics, took root slowly among the western nations. Up to within a hundred years of Columbus' voyage, the University of Prague was considered progressive for offering a course of lectures on the art of reckoning with the fingers. The scholarship of England was content, in Shakespeare's day, with less mathematical instruction in the great universities of Oxford and Cambridge than is now given in village schools. Now and then a master mathematician, a Napier or a Newton, appeared in private life or among the learned professors, but mathematical lectures were not popular. Gentlemen's sons left arithmetic to "mere shopkeepers," who in turn got on with exceedingly crude methods of casting accounts. A recent writer, referring to the still more recent neglect of arithmetic in the noted preparatory schools of England, as Eton, Harrow, and Rugby, remarks: "We are safe in saying that before the close of the past (18th) century the ordinary school boy of England's famous public schools could not divide 2,021 by 43, though such problems had been performed centuries before by boys brought up on the banks of the Ganges."

In the American colonies, the college of William and Mary included a professor of mathematics in its first faculty, 1688, and thus enjoys the honor of having established the first American chair of mathematics. In 1749 the college faculty granted George Washington a commission as a land surveyor, which we may suppose fairly exhausted the mathematical curriculum of that college. A member of the Yale class of 1714 testifies that common arithmetic and a little surveying were the full extent of the mathematical instruction received by his class. The records of Harvard show that at this date two hours a week in the senior year were given to arithmetic, geometry, and astronomy, while algebra was not introduced until 1726.

Of arithmetic in the elementary schools of the colonies little can be said; for elementary schools existed only in the larger towns and the most favored localities. Arithmetic in the schools was confined to counting and to exceedingly simple combinations of integral numbers, or was not taught at all. Ordinarily the teacher, unless he were some collegian earning a trifle to help himself on his way, could not work in fractions, and indeed he was thought to do his whole duty if he kept order and taught the brighter children to read and write.

After the close of the American Revolution educational facilities improved rapidly. Arithmetic soon gained an acknowledged place in a boy's education, but we were well on into the nineteenth century before arithmetic was considered suitable for girls. Arithmetic for boys, but needlework and knitting for girls.

As has been said, our earliest arithmetical ideas and our arithmetical texts were brought over from England. One of these early school books was a primer by George Fox, published in England in 1674, and subsequently republished in this country. It contained the alphabet, exercises in reading and spelling, explanations of Scripture names, Roman numerals, lessons in the

fundamental rules of arithmetic and weights and measures, a perpetual almanac, and a Friends' catechism. This book was popular in Philadelphia. Similar texts were used in New England and in Virginia. Hodders' *Arithmetic, or That Necessary Art Made Most Easy,* published in London, 1661, and republished in Boston in 1719, is said to be the first purely arithmetical book printed in this country. In his *Autobiography* Benjamin Franklin mentions *Cocker's Arithmetic* as having been of great service to him. This text appeared in London in 1667 and was reprinted in Philadelphia during the Revolutionary War. It was an authority so long that "according to Cocker" became a proverb. Dilworthe's *Schoolmaster's Assistant,* the most popular of all English arithmetics used in this country, was published in London in 1744. Several American editions appeared, the last in Albany as late as 1824.

The first American arithmetic was written in 1729 by Isaac Greenwood, the first professor of mathematics in Harvard College. It was designed for the use of his college classes, and had little or no circulation outside. During the forty years which followed the Revolutionary War, a large number of arithmetics appeared in America. Three of these are famous,—*The New and Complete System of Arithmetic,* by Nicholas Pike, (Newburyport, 1788); *The Schoolmaster's Assistant,* by Nathan Daboll, 1800; and *The Scholar's Arithmetic,* by Daniel Adams. Other arithmeticians and their numerous texts have passed from memory, but Pike, Adams, and Daboll were held in affectionate remembrance by the grandfathers of the generation now in school, and the names of these three are sure of a place in the list of American educators.

Some of the characteristics of these early texts may be stated as follows:

1. An imperfect and evasive treatment of fractions as though the author did not understand the subject.

2. Cancellation was apparently unknown.

3. The English system of periods of six places each was followed. A billion was considered a million million.

4. No mental problems were given.

5. The rule of three, proportion, was taught as a mere rule, ignoring ratios and their equality.

6. Certain indirect solutions were sometimes introduced practically based on showing that results other than the right one were incorrect.

7. An attempt was made to introduce pleasing and ethical features, such as puzzles, and problems based on the expensiveness of vice.

8. Explanations were calculated merely to explain the application or working of *rules.* No attempt was made to give reasons why a step was legitimate or why a certain operation gave a correct result.

As might be expected, recitations were unheard of. Each pupil "ciphered" for himself and crowded up with the others to his instructor's desk to have his "answer" approved, to have a new "sum set," or to be admonished, as the case might be, for inability to "follow the rule."

Of recent years it may be said that a popular knowledge of arithmetic is greater in those sections of North America where public schools have reached their highest efficiency than in any other part of the world; but our contribution has been made to methods of instruction and to business methods. In its theory we follow the Hindu arithmetic practically unchanged.

The earliest mathematical notions of children and of savages are geometrical and physical rather than numerical. Dim graspings of space, distance, time, and mass precede the ability to make a distinction between one and more than one. Even with some command of number the primitive mind clings to other modes of expression. Children speak of a great distance by saying "a l-o-n-g way off," the prolongation of *long* being proportionate to the fancied distance. The Coeur d'Alene Indians indicate the proximity or remoteness of a lake or a river, by pronouncing the word "syah" with a peculiar upward prolongation of the first syllable so expressive that, to one who understands the customs of the mountains, they convey an accurate idea of whether the lake is an hour, or a day, or a week's journey distant.

Yet we must believe that counting is nearly as old as speech. Travelers have found no tribes so low in the scale of intelligence as to have no numerals. Even domestic animals are thought to have some idea of number. Farmers have a theory that crows can count as far as three. This is only a theory, however, based on a tradition that if a party of hunters enter a cornfield singly or in a group to lie in ambush for the black robbers, the crows will not come near until *three* men have gone away.

Each language and district has its series of numerals, but nearly all are based on five or some multiple of five. The inhabitants of New South Wales have but four numerical words in their vocabulary—a word each for one, two, and three, and an additional word for an indefinite number, having some such signification as many or plenty. To express five they display the fingers of one hand, and for ten the fingers of both hands. To express a greater number, which we may believe is seldom necessary, the fingers of an additional person are brought into use. In many aboriginal dialects, the word for *five* is also the word for *hand,* while *ten* is equivalent to *two hands.* Going a step further, certain South American tribes call the toes into requisition. Ten is expressed by a word meaning *all the fingers;* twenty, by *all the fingers and toes.* The term for forty is *fingers and toes of two men.* Other South American numerals with their significance are: five, *the hand finished;* six, *one of the other hand;* ten, *two hands finished;* eleven, *foot one;* twelve, *foot two,* etc. The Caribbean words for ten and twenty are quite poetic, signifying *all the children of the hands* and *all the children of the hands and feet.*

In the Zulu language the word for five is *finish hand;* for six, *taking the thumb;* for seven, *pointer;* for eight, *keep back two fingers;* for nine, *keep back one finger;* while at the word for ten the open hands are clapped together. If the student will begin at the little finger of the left hand and count to the left thumb, then to the right thumb and right forefinger, he will see why they are so named.

The Eskimo expression for twenty is *man,* for forty *two men.* Illustrations may be given without number to show that counting is based usually on the fingers and toes.

The Aztec numeral system is interesting not only in its formation but also for its system of pictorial representation. A small banner or flag denoted twenty; if divided into corner sections by a vertical and by a horizontal line passing through the center, and one of the sections was colored, the flag indicated five; if two sections were colored, ten; if three, fifteen. Numbers below five were denoted by as many dots. Twenty 20's or 400 were indicated by a feather or quill, the hollow stock of which was commonly used to contain gold dust. Twenty 400's or 8,000 were denoted by a treasure *sack* or *purse.* Thus 12,038 in our system would have been denoted in the Aztec system by a running picture of one sack, ten quills, one full flag, one flag three-fourths colored, and three dots.

The Egyptian hieroglyphic system is like the Aztec in principle, differing only in symbols and in scale. One is a straight vertical *stroke* representing a *staff.* The next symbol, the significance of which is not known, denotes ten and resembles an inverted U or a croquet *wicket.* The third symbol denotes 100 and resembles the *spiral* line to be had by slicing a flat snail shell. One thousand is denoted by an object which for want of a better word we shall call an *image.* Ten thousand is denoted by a *pointing forefinger;* 100,000 is denoted by a *fish;* 1,000,000 by a *man* holding up both hands in utter amazement, and 10,000,000 is represented by a *circle* resting on a line, possibly suggestive of the universe or the uttermost bounds of knowledge. The scale is uniformly ten. Thus to write 1,200,042 in the Egyptian system we represent *one man in amazement, two fishes, four wickets,* and *two vertical staves.*

In the last two systems we have examined, and the list may be extended indefinitely, we may notice:

1. There is a *distinct symbol* for each order. In the Aztec system we have dots, flags, quills, and sacks for ones, twenties,

four hundreds, and eight thousands. In the Egyptian system we have a peculiar and unmistakable sign for ones, another for tens, another for hundreds, and so on. The sign for one order can never be used for another order. The sign for two tens cannot be used for two hundreds. We must use wickets for tens and spirals for hundreds.

2. *The value of a symbol is the same wherever it is placed.* A *flag,* a *dot,* two *quills,* three *dots,* and a *sack* would signify the same number as a *sack,* two *quills,* a *flag,* and four *dots.* The value of the number is to be found by adding the values of the various signs regardless of their position.

3. *Repeating a symbol repeats its value.* To express the value of any number of flags less than enough to make a quill, it is necessary to repeat the symbol *flag.*

It is clearly evident that systems of counting arose from using the fingers and toes as counters. As to the origin of higher orders we have the germ in the very natural step of setting aside some object as a counter every time the tale of fingers or of fingers and toes was completed. Certain African tribes set aside a pebble for each five, the Aztecs evidently set aside a counter for each twenty. The inhabitants of some of the islands of the South Pacific count with nuts and cocoanut stalks, laying down a small stalk for each ten and a large stalk for each hundred, that is, for ten small stalks. Two *large stalks,* four *small stalks,* and six *nuts* would therefore signify *two hundred forty six.* The tens and hundreds of our numeral system originated, beyond a doubt, in some such primitive device. Instead of saying *one big stalk, little stalk,* we say *one hundred ten,* with this difference, that we forgot centuries ago what our words originally meant. Crude as *four big stalks, three nuts* may sound, and crude as it might seem to express 403 in South Sea symbols, our system has but three essential improvements over that of the Aztec, the Egyptian, and the South Sea Islander:

1. The Hindu hit upon the plan of representing the higher orders (tens, hundreds, thousands,) by the same characters used to denote the *ones.* In the primitive systems we have examined, as that of the Egyptians, it made no difference whether we drew four *wickets* and three *staves* or three *staves* and four *wickets.* In either case the sum of the symbols is to be taken and it is immaterial which stand first; but in the Hindu system place is made essential. There is a difference between 43 and 34. The first place is reserved for ones, that is for numbers from 1 to 9. The place on the left of ones is reserved for tens, and the third place, the second to the left of ones, is reserved for hundreds, etc. A symbol for four may be made to stand for four tens or for four hundreds by the simple device of putting it in the second place or the third place as may be desired. In this way it becomes unnecessary to retain separate symbols for tens, hundreds, etc., and this cumbersome feature of the aboriginal systems falls off. So important is the feature of position or place that the learned Hindu regarded it as a direct revelation from heaven.

2. Another step in advance is that of using distinct characters for each number less than ten. Instead of repeating *dots, staves,* or *nuts,* or indeed counters of any kind, the Hindus made a set of characters ranging from 1 to 9, from which our own have been derived.

3. The Hindus also hit upon the idea of using a character without value, a mere space filler, to occupy places not needed by the symbols of the number. Thus in writing 240, they used a cipher, 0, to fill the first place and throw the numeral 4 into the second place where it must be to stand for four tens. Otherwise the number would read twenty-four. This device of a cipher, in itself of no value, obviates the necessity of using ruled columns.

The Roman method of notation, by means of the letters I, V, X, L, C, D, and M, now seldom employed except for paging or sectioning, was at one time the sole reliance of European merchants and mathematicians. As late as the middle of the sixteenth century English shopkeepers kept their books and rendered their accounts in cumbrous Roman numerals. The

Roman numerals, however, were used only to record results. Computations were made with the aid of counters or with a numeral frame called an abacus.

The names of our first ten numbers have lost their original meaning. A certain African tribe says *bird's foot* for *four,* referring of course to the toes, three forward and one rear, on the foot of a bird. Doubtless our one, two, three, four, five, six, seven, eight, nine, and ten, had some such meaning before they were used for numerals, but, however that may be, all trace of their original force has disappeared. For all that we now know of their history, six, seven, and eight might as well have been used in the reverse order. Eleven and twelve are from old Gothic forms *anlif* and *twalif,* in which we recognize the Scottish *ane* and *twa* prefixed to *lif* which is thought to signify ten. Thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, and nineteen are evidently three-ten, four-ten, etc. Twenty is twain-tens. Thirty is three-tens. Hundred is *hund-rede,* in which *rede* means a number or account. Thousand has now no other significance. Million is from the Latin word *mille,* signifying thousand, and means a great thousand. Billion and trillion are from *bi* and *million* and *tri* and *million,* signifying the second and third powers of a million, from which, however, we have diverted them. Naught comes from *ne* and *aught,* meaning not aught, not anything, nothing.

The characters used to express numbers are nine digits or significant figures, a cipher, and a decimal point:

1, 2, 3, 4, 5, 6, 7, 8, 9, 0, .

The first three digits are supposed to be modifications of one, two, and three pencil strokes. Of the first it is unnecessary to speak. An approximate 2 may be formed by making two short *horizontal* strokes, carrying the pencil on the paper from the right end of the first stroke to the left end of the second so as to form a Z. A three may have developed, it is thought, from three horizontal strokes, the pencil being carried on the paper as before. An examination of old script forms lends plausibility to this theory. 4 to 9 inclusive are said to be modifications of the initial letters of the old Indo-Bactrian names of the numbers they represent. 0 is considered a Brahminic symbol. It may be called zero, cipher, or naught, but never *aught.* The decimal point is a clerical device of modern origin, due to Simon Stevin, the Belgian inventor of decimals.

Nothing could be more fatal to a scholarly apprehension of our present system of arithmetic than to take the features of the system for granted, as though they were inherent in the principles of civilization and could not be otherwise. We have been so long accustomed to say that $3 \times 4 = 12$ that the expression $3 \times 4 = 22$ seems ridiculous; yet if the student will follow patiently he will see not indeed that the product of 3 and 4 is ever other than a dozen, but that a dozen may be written 22 quite as reasonably as it may be written 12. All depends on our understanding of the meaning which attaches to the numerals in their various positions. If our system were based on five and its powers, instead of on ten and the powers of ten, that is if we set aside a counter for each five instead of one for each ten, we should need but four digits. Seven would be written as a five and two ones, thus, 12. A dozen would be written as two fives and two ones, or 22. If 4,312 be a number written on the scale of five, it is composed of 4 one-hundred-twenty-fives, 3 twenty-fives, 1 five, and 2 ones. On the same supposition 20.2 is composed of 2 fives and 2 fifths. Such a system would be called a quinary instead of a decimal system.

Ar'ius. See ARIANISM.

Arizona, one of the new southwestern states. It is situated on the Mexican border, between New Mexico and California. In shape it approaches a rectangle. Land area, 113,020 square miles. The name is Spanish, meaning arid zone. There are but 100 square miles of water in Arizona. The northern part of Arizona is a vast plateau, 45,000 square miles in extent and averaging about 7,000 feet above sea level. It carries numerous lava ridges and volcanic peaks of which Mt. Humphreys, near Flagstaff, reaches a height of 12,794 feet,

being the highest point in the state. The edges of the plateau are cut by deep canyons and through it extends the Grand Canyon of the Colorado. Farther south the surface drops off to a region of parallel mountain ranges trending northwestward from the Sierra Madre of Mexico. This is the chief mineral belt of the state. To the south and west of the mountain region lies the desert section, crossed by low ranges of mountains separated by broad, arid plains of low elevation. The entire state is drained by the Colorado into the Gulf of California. All the streams are subject to great fluctuations in volume and many are dry during a large portion of the year. The upper portions of the Salt, Gila, Verde, and Little Colorado Rivers contain constant flows of more or less volume during the entire year. The annual rainfall varies from five inches in the desert region to twenty-five or more along the edge of the plateau. There are two rainy seasons. The summer rains extend through July, August, and September. The winter rains occur at intervals from November to March and are the chief source of water for irrigation. April, May, and June are the driest months. The average temperature of the desert region is seventy degrees; of the plateau, fifty degrees. Though the temperature occasionally rises to 120 degrees in the desert section, the sensible temperature is greatly reduced by the absence of humidity. Sunstrokes are practically unknown. The summer climate of the plateau is delightful as is also the winter climate of the lower valleys. The dryness of the atmosphere renders the region a desirable one for invalids. The sunshine averages 80 per cent of the possible amount.

Products. In the plateau and mountain regions, native grasses support large numbers of sheep, cattle, and goats. From the Grand Canyon to the White Mountains extends one of the largest bodies of virgin pine timber in the United States. The mills of Flagstaff and Williams have a combined capacity of over 300,000 feet of lumber daily. The native growth of the desert plains consists largely of sage brush, creosote bush, mesquite, yucca, and cactus, with cottonwood along the streams, but the desert soil is fertile and responds to irrigation with abundant crops. It is estimated that about one-fourteenth of the state may ultimately be brought under intensive cultivation by means of irrigation. In 1920 there were 467,349 acres under irrigation. The largest irrigated region is in Yuma County, most of the water being supplied from Laguna Dam reservoir. The next largest area is in Salt River valley. The development of this region followed the completion of the Roosevelt Dam. It was formerly an important dairy region but raising long staple cotton has become the chief industry.

In 1920, 120,000 acres were planted to cotton and the state crop amounted to 110,000 bales. The soil is fertile and semi-tropical fruits—lemons, oranges, apricots, raisins, grapes, figs and almonds—thrive in irrigated regions. Alfalfa is also extensively grown and raising live stock is a profitable branch of agriculture. Wheat and barley are grown and the beet sugar industry is well established.

Minerals. Arizona is the leading state in the production of copper, and one of the foremost states in the Union in mineral wealth. Gold and silver are produced in paying quantities. The output of gold in 1920 was 380,034 ounces and that of silver, 6,098,251 ounces. A part of the gold and silver is obtained in the reduction of low grade copper ore but some gold and silver mines are worked for these metals alone. Lead, coal, iron, tin, nickel, platinum, mercury, borax, salt and sulphur are found.

A marvelous petrified forest in Navajo County near Holbrook, attracts many visitors. Tree trunks a yard in diameter have been turned into stone and have broken into cylindrical blocks of exquisite coloring. Fine specimens of opals, garnets, chalcedony, sapphire and turquoise are found. Onyx is quarried and used for table tops and interior decorations.

Transportation and Manufactures. Arizona is crossed from east to west by the Atchison, Topeka & Sante Fe and Southern Pacific railways. A branch line extending from Ash Fork on the Santa Fe

through Prescott and Phoenix connects these systems. Each system has other branch lines extending to the more settled portions of the state, and a branch of the Santa Fe extends from Williams to Grand Canyon National Park.

The chief manufacturing industries are those related to lumber, to mining and to repairing locomotives and railway cars.

POPULATION. In 1920 the population was 334,162. The increase during the decade 1910-1920 was 129,808 or 63 per cent. The number of inhabitants to the square mile in 1920 was 2.9 and the rural population constituted 64.8 per cent of the whole. The most populous cities are Phoenix, 29,053; Tucson, 20,292; Douglas, 9,916; Bisbee, 7,205; Globe, 7,044; Miami, 6,689; Prescott, 5,010.

EDUCATION. A thorough system of public schools is maintained and the percentage of average attendance is higher than in some of the more densely populated states. The University of Arizona was opened at Tucson in 1901. In 1920 the enrollment was approximately 900. In 1919 the University became a member of the Association of American Colleges. The Agricultural Experiment Station, the Arizona bureau of mines, the state pure food laboratory and the state museum are located on the University campus. Efficient normal schools are located at Flagstaff and Holbrook, and a state school for the deaf is affiliated with the University.

GOVERNMENT. The governor, secretary of state, auditor, treasurer, attorney-general and superintendent of public instruction are elected. The term of office is two years. The treasurer is not eligible for re-election. The legislature consists of a senate and a house of representatives. The initiative, referendum and recall are in force.

HISTORY. Arizona was visited by the Spaniards in 1539. In the following year, Coronado led an expedition to the settlements of the Hopis and Zunia. He found the remains of ancient cities, aqueducts, and temples, indicating that the region was at one time the home of some prehistoric race, familiar, like the Aztecs, with the art of building. Aztec legends locate the "Seven Cities of Cibola" here. In 1560 Tucson was founded by the Spaniards. Citizens assert that it is an older town than St. Augustine, Florida. The region was acquired from Mexico by treaty in 1848. A strip south of the Gila formed, however, a part of the Gadsden Purchase, made in 1853.

Arizona became a territory in 1863, and a state February 14, 1912. Although in the early days settlement was retarded by the depredations of the Apaches and other Indian tribes, these troubles have long since ceased to interfere with progress. Remote sections are being developed by branch railways and the advent of the automobile has led to the construction of an efficient system of state highways.

STATISTICS. The following are the latest reliable statistics to be had:

Land area, square miles	113,664
Water area, square miles	146
Forest area, acres	5,350,000
Irrigated area, acres	467,565
Population (1920)	334,162
White	291,449
Negro	8,005
Indian	32,989
Foreign born	78,099
Chief cities:	
Phoenix	29,053
Tuscon	20,292
Bisbee	9,205
Number of counties	14
Members of state senate	19
Members of house of representatives	35
Salary of Governor	$ 6,500
Representatives in Congress	3
Assessed valuation of property	$884,455,682
Bonded indebtedness	$ 2,991,925
Improved land, acres	712,803
Corn, bushels	1,015,000
Wheat, bushels	840,000
Oats, bushels	630,000
Hay, tons	450,000
Potatoes, bushels	460,000
Barley	928,000
Domestic Animals:	
Horses	120,000
Mules	12,000
Milk cows	45,000
Other cattle	1,110,000
Sheep	1,200,000
Swine	40,000
Manufacturing establishments	480
Capital invested	$101,486,070
Operatives	9,931
Raw material used	$ 92,645,437
Output of manufactures	$120,769,112
Silver output, ounces	6,098,251
Gold output, ounces	380,034
Copper output, tons	279,617
Miles of railway	2,477

Ark, a chest, coffer, or large vessel. For an account of the ark constructed by Noah, which saved himself and family from the deluge and landed them at Mt. Ararat, the reader is referred to the Biblical account contained in the sixth chapter of Genesis. The ark of the covenant was a sacred chest of acacia wood, overlaid with gold, which was kept in the holiest place of the Jewish tabernacle, and when completed of the temple. It contained the tables of stone on which were written the ten commandments.

Arkansas, ăr-kan-saw′, one of the south central states. "The Bear State." Land area, 53,045 square miles. Arkansas lies on the west bank of the Mississippi between Missouri and Louisiana. Roughly speaking, the state may be divided into three regions. These are the lowlands along the Mississippi and other rivers; the Ozark mountain region of the northwest, the higher peaks of which rise to an altitude of 2,800 feet; and the hill country between the two. The waters of the state either flow into the Mississippi directly through the White, the St. Francis, and the Arkansas; or indirectly through the Ouachita (wash-i-ta) and other tributaries of the Red River which winds through the southwestern corner. The Mississippi and Arkansas are navigable for deep water steamers throughout the state. The other rivers named are not so deep.

AGRICULTURE. Agriculture is the leading industry. Four varieties of soil are recognized—the sandy soil of the Ozark, the clay loams of the hill country, the gumbo of the Red River valley, and the black soil of the eastern low lands. In 1920 the farm area was over 17,566,000 acres of which 9,239,000 acres was improved land. Cotton and tobacco are grown in the southern part of the state. Cotton is the chief crop with an annual yield of about 1,000,000 bales. Rice is grown on the low lands and in 1921 Arkansas ranked second among the rice producing states.

In the northern part of the state corn, wheat, oats, potatoes, hay and forage crops are grown. The northwestern section is widely known for its fruits, especially apples and peaches. The strawberry crop is valued at about $1,000,000 a year. Raising live stock is an important branch of agriculture. The annual wool clip is about 450,000 pounds.

MINERALS. The chief mineral regions are in the Ozarks and the southern part of the state. Bituminous coal, salt, ochre, phosphates, zinc, marble, sand for glass, lime, sandstone, petroleum, natural gas, bauxite, manganese, grindstones and whetstones, the chalk for Portland cement are found. The oil stones and whetstones from the Ouachita Valley are considered the finest in the world. In 1920 platinum was discovered near Batesville. Previous to 1915 the production of natural gas was small. In that year a strong well was opened in Crawford County. In 1920 the output of the wells near Fort Smith was 200,000,000 feet. Oil was discovered in the El Dorado region in 1921, and by August the production was over 1,000,000 barrels a month. Clay found in Saline County is used in the manufacture of high grade pottery. Its mineral waters have given the state an international reputation. See HOT SPRINGS.

MANUFACTURES. Nearly three-fourths of the state is covered with forests of southern pine, white oak, hickory, pecan, ash, elm, black walnut, locust, pawpaw, hornbeam, gum, sycamore, red oak, maple, cottonwood, red cedar and cypress. The manufacture of lumber and lumber products takes first place, followed by the manufacture of cottonseed products. The annual timber cut is about five billion feet, about one-half of which is used for lumber. Some of the largest sawmills in the world are found in the southeastern part of the state near the pine forests.

TRANSPORTATION. River transportation is still important, especially in connection with foreign trade. Exports are forwarded to New Orleans by water where they are transferred to ocean-going ships. In 1920 there were 5,220 miles of steam railways and over 150 miles of electric railways. The state is rapidly improving its highways and approximately 60,000 automobiles and trucks are licensed annually.

POPULATION. The census of 1920 re-

turned a population of 1,752,204. The increase for the decade 1910-1920 was 177,755 or 11.3 per cent. 1,265,782 or 72 per cent were whites and 472,220 or 27 per cent were Negroes. Over five-sixths of the population is rural. The cities having over 5,000 inhabitants are Little Rock, 65,142; Fort Smith, 28,870; Pine Bluff, 19,280; Hot Springs, 11,695; Jonesboro, 9,384; Texarkana, 8,257; Paragould, 6,306; Van Buren, 5,224; Mirianna, 5,074; Blytheville, 6,414; Fayetteville, 5,332; Helena, 9,112; West Helena, 6,226.

EDUCATION. The large rural population makes the problem of education difficult. In 1920 the school population numbered 676,000. Over two-thirds of these were in regular attendance upon public and high schools. The school fund is increasing with the development of the state's resources. The University of Arkansas, the State Normal and four agricultural high schools are supported by a special state tax. The normal schools, academies and colleges are in private hands. The Deaf Mute Institute and School for the Blind are at Little Rock.

GOVERNMENT. The present constitution was adopted in 1874. The state officers are elected for two years. They are the governor, secretary of state, treasurer, fire marshal and insurance commissioner, attorney-general, superintendent of education, commissioner of agriculture and commissioner of public lands. The legislature consists of two houses, a senate, members of which are elected for four years, and a house of representatives, elected for two years. Sessions are limited to sixty days, unless two-thirds of each house vote to extend the time. Suffrage is restricted to those who have resided in the state for one year and in the county six months and who have paid a poll tax.

HISTORY. De Soto and his companions were perhaps the first whites to enter the state. Some authorities hold that De Soto's followers buried him in the Arkansas River. The first settlers were French. Arkansas was a part of the Louisiana Purchase. It formed a part of the territories of Louisiana, 1803, and Missouri, 1812, respectively. It was erected into a separate territory in 1819, with a population, including Indians, of about 10,000. The first newspaper, the *Arkansas Gazette,* was established the same year at Arkansas Port. June 15, 1836, Arkansas was admitted as a slave state. In 1860 the hill country was Union in sentiment, the lowlands were in favor of secession and carried their point, May, 1861. The state was readmitted in 1868. Under a constitutional amendment of 1893, voters must have lived in the state a year and pay a poll tax.

STATISTICS. The following are the most reliable available statistics:

Land area, square miles	52,525
Water area, square miles	810
Forest area, acres	22,000,000
Population (1920)	1,752,204
White	1,279,984
Negro	472,220
Chief cities:	
Little Rock	65,030
Fort Smith	28,870
Pine Bluff	19,280
Hot Springs	11,695
Number of counties	75
Members of state senate	35
Members of house of representatives	100
Salary of Governor	$ 4,000
Representatives in Congress	7
Assessed valuation of property	$575,121,647
Bonded indebtedness	$ 2,266,410
Farm area, acres	17,566,353
Improved land, acres	9,238,893
Corn, bushels	60,148,000
Wheat, bushels	958,000
Peanuts, bushels	308,676
Cotton, bales (500 lb.)	860,000
Domestic Animals:	
Horses	258,000
Mules	327,000
Milk cows	429,000
Other cattle	643,000
Sheep	191,000
Swine	1,459,000
Manufacturing establishments	3,123
Capital invested	$138,817,974
Raw material used	$102,812,977
Operatives	49,954
Output of manufactures	$200,312,858
Miles of railway	5,220
Pupils enrolled in public schools	461,591

Arkwright, Richard (1732-1792) an English inventor, a native of Lancashire. Arkwright, the son of a workingman, after receiving a little schooling, took up the trade of a barber, and made a little additional money by a method of his own for dyeing hair. Arkwright lived in a weaving country, and having an inventive nature, he hit upon a device for producing

fine thread. An acquaintance had already invented machinery for twisting cotton thread, but it was still too coarse for the threads of warp that run lengthwise of a web. Arkwright caught an idea from seeing red hot bars of iron pressed into thin sheets by running between successive pairs of rollers, each pair set closer than the preceding pair. He conceived the simple idea that if the amount of cotton going to make an ordinary thread be fed between a pair of slow going rollers and be caught by a second pair of rollers going at ten times the speed, the cotton would be strung out to make a thread of one-tenth the weight. By this simple device of feeding through two pairs of rollers, the second pair geared at a high speed, he found that he could produce cotton thread of uniform size and, within reasonable limits, of any weight desired. We cannot go into the particulars of opposition from spinners who thought their occupation and wages gone; of wealthy manufacturers who dreaded competition and expense of new machinery. Arkwright's patents were fought from court to court, his mills were burned by infuriated workmen, but toward the end he triumphed over ignorance, custom, and wealth. He built and organized a factory recognized as the type of today, and, what is of less importance, he became wealthy, held office, and was knighted by his sovereign.

Armada, är-mā′da, a general Spanish term meaning a large naval force. The fleet known as the Spanish Armada was fitted out by Philip II, king of Spain, in 1588. Philip aimed at one despotic world-empire. Under Queen Elizabeth, little England (with only 4,000,000 of people at that time) entered into a daring rivalry with this dangerous might. English money and thousands of English volunteers, like Sir Philip Sidney, helped to keep alive the gallant rebellion of the Dutch against Spain; while adventurers, like Drake and Raleigh and Grenville, ravished Spanish treasure on the seas and on the coasts of America, even challenging the Spanish monopoly of the Pacific. All this was before war had been declared. Finally Philip determined to concentrate his tremendous resources for the conquest of the hornet's nest, to put an end to these annoyances. For years preparations went on on a vast scale in many ports. The Spanish power included not only Spain and Portugal, but also Burgundy, the Netherlands, most of Italy, practically all America, North and South, and the rich "Spice Islands" of the East Indies. The German states, under the lead of Austria, were held in close alliance. Pope Sixtus V gave England to the Spanish crown.

In 1588 the "Invincible Armada" was dispatched to subdue the country and take possession. Misfortune seemed to overtake it from the start. The fleet was scarce out of port when it was scattered by a storm and was obliged to put back to refit. When, finally, it advanced up the English Channel in the shape of a half moon, the fleets seemed unequal. The English ships were for the most part merchant vessels transformed into a navy. The Spanish men-of-war were huge of bulk and towered above the English ships. The English fleet, however, was the more wieldy, and the English were better marksmen. The British seamen went into the fight right gallantly. Lord Howard, the British naval commander, out-generaled, out-shot, out-sailed, and out-fought the enemy, taking their treasure ship, sinking others, and completing the demoralization of the Spanish by sending fireships among them as they lay becalmed. The grappling, boarding, and slaughter on bloody decks is described in the annals of naval warfare as appalling. The Spaniards fought bravely, for the best blood of Spain was there, striking a blow for honor, for the glory of native land, and for the mother church; but the invader is ever at a disadvantage, and they were outmatched by the British seamen. The English fought for home and fireside and won the day. At length the Spanish commander resolved to withdraw. He attempted to take his fleet home by way of the North Sea and around the north and west of the British Isles, but was caught in a terrific hurricane. He lost many of his ships and men on the rocky coasts of Norway, Scotland, and Ireland, and many ships found-

ered at sea. Of 131 ships, 19,000 marines, and 8,000 sailors that went forth from Spain only 50 ships and a scant half of the men ever returned. The flower and chivalry of Spain were represented in the expedition, for it was expected to rival that of William the Norman, who wrested England from Harold in 1066. The adventurous youth of Spain, of the same sort of blood that ran in the veins of De Soto, Pizarro, Cortez, and Narvaeth, desired to be on hand to divide up the country. Lamentations for dead sons were heard all over the land. Spain never recovered from the blow, or attempted seriously to contest further the supremacy of the sea.

The number of men and ships engaged in this sea fight may seem small compared with modern naval engagements, but the conflict was one of the truly decisive battles of the world. The English victory saved free institutions and Protestantism in Europe. It paved the way for English colonization in North America. Had the battle gone otherwise, the Spanish type of civilization, which, as we see, got a foothold in Mexico and the southwest, might have prevailed in North America.

An account of the battle may be found in Charles Kingsley's *Westward Ho.*

Armadillo, an American mammal of the sloth family, noted for its defensive armor. There are at least four species, variously distributed from Texas to Argentina. The largest is three feet in length not counting the tail; the smallest is only five or six inches long. All armadillos are armed with strong claws, and dig rapidly, being able to escape pursuit by burying themselves in the ground before an ordinary pursuer can overtake them. Ordinarily the armadillo rests on the ground like a tortoise. When alarmed it raises itself up on the very tips of its long claws and scuttles about quite actively for a short time. The different species are variously covered with scales not unlike those of an alligator, and some species have the power of rolling themselves up into balls, so as to present a defensive surface at every point. Like the anteater, the armadillo lives chiefly on insects, worms, snails, lizards, fruits, and roots. The armadillo is related to the anteater, but its tongue cannot be protruded. The natives of South America eat the armadillo, but its flesh is offensive to the ordinary palate. Armadillo steaks are served in the restaurants of Buenos Ayres. Some travelers who affect to like them claim that they taste like spring chicken. See ANTEATER; SLOTH.

Armenia, Republic of, politically, connected by agreements with the Russian Soviet republic; area 15,240 square miles; population in 1920, 1,214,391. It was formerly a factor in the trade between the East and West, but it has been overrun for centuries by contending armies. Before the advent of the Great War, Armenia was divided among Russia, Turkey, and Persia. Originally a great nation, whose monarch a century before Christ was the mightiest in Asia, Armenia numbered 30,000,000 people. She was the first country in the world to adopt Christianity as a state religion. Almost immediately this provoked the hostility of Persia, and later of Russia and Turkey, who desired to establish their various faiths and absorb the Armenian Church. Armenia firmly resisted and declared: "From this faith, no force can move us. . . . We shall accept no God in place of Christ." In 1375, after more than 1,000 years of struggle, the last vestige of Armenian independence passed away. Magnificent ruins speak of former wealth and power but the Armenians became a distressed people oppressed both on account of race and religion.

In race they are essentially a European people and those of today bear a resemblance to the inhabitants of modern Greece. They are naturally gifted, thrifty, and of fine parts. "We find them," says a recent commentator, "as bankers, merchants, shopkeepers, manufacturers, lawyers, doctors, teachers, engineers, and officials all over the Caucasus and even in European Russia." The Turks were astute enough, despite their persecutions and hate, to appoint Armenians to positions of the highest honor in directing Turkish schools, government, etc. The fine stuffs so admired in Europe as Turkish products are really Armenian manufactured.

Armenia is fertile and produced cotton, grain, grapes, and tobacco, but the masses lived in squalid poverty under the grasping hand of relentless raiders and tax-gatherers. Early in August, 1914, Turkey sought to induce the Armenians to remain neutral and loyal to their respective governments. But Russia was reported to have verbally offered autonomy to Armenia. Hence, thousands deserted Turkey and joined their brother volunteers in Russia. Thereupon followed the series of unparalleled atrocities perpetrated by Turkey. It was a war of murder and deportation. Whole communities were wiped out—men killed, families separated, women and girls violated. Children were sold or thrown into rivers to escape starvation. About three-quarters of a million non-combatants perished.

The close of the war left the Armenians in a deplorable condition. In July, 1918, the Turks agreed to recognize the "Armenian Independent Republic of Ararat," but in December the Turks surrendered to the Allies. The allied troops were withdrawn from the country, leaving the Armenians at the mercy of the Turks. In 1921 the Armenian republic was taken over by the Soviet Government and conditions became worse. In January, 1922, the remnant of 120,000 besought the League of Nations to transport them beyond the reach of their hereditary enemies. The nation has disintegrated with little prospect of reuniting.

Amidst these natural fastnesses, in a country of lofty ridges, deep and narrow valleys, numerous and copious streams, and occasional broad plains—a country of rich pasture grounds, productive orchards, and abundant harvests—this interesting people has maintained itself almost unchanged from the time of the early Persian kings to the present day. Armenia was one of the most valuable portions of the Persian empire, furnishing, as it did, besides stone and timber, and several most important minerals, an annual supply of 20,000 excellent horses to the stud of the Persian king.—G. Rawlinson, *Five Great Monarchies*.

Armenius. See HERMANN.

Arminius (1560-1609), a distinguished Dutch theologian. His original name was Hermanson, but after the Latinizing fashion of the day he thought Arminius more scholarly. Arminius was a profound student, a genial, public-spirited clergyman. He was exceedingly tolerant in his views, and upheld popular education. Interest in Arminius centers in his opposing the Calvinistic doctrine of predestination with the Arminian doctrine of free will. He became professor of theology in the University of Leyden.

Armistice, a military term. The literal meaning of the word is a standing still or rest of arms. An armistice may be a suspension of hostilities for a few hours in order to hold a parley or bury the dead; or it may be protracted indefinitely with a view to the negotiation of peace. During an armistice it is a point of military honor that neither party shall take steps to render its position stronger at the close than it was at the beginning. At such a time it is considered dishonorable to repair fortifications, dig trenches, or anything of the sort. An armistice may be agreed upon between two commanders on the field of battle, or between two governments. In either case, the territory and the length of time are specified carefully.

Armor, defensive covering worn to protect the person against weapons. The armor worn by the Greek warriors at the siege of Troy consisted of four pieces. The helmet was a metal cap, designed to protect the head. The cuirass consisted of a bronze breastplate and a back piece reaching from the neck to the girdle, somewhat comparable to a vest. The two pieces were laced together at the sides with leather thongs. Bronze greaves or plates covered the leg to the instep. The fourth piece was a round or oval shield held in the hand. It is described as made of bronze, lined or backed with bull's hide. It was long enough to protect the entire body. At the beginning of the Middle Ages the armor consisted chiefly of mail; that is to say, flexible garments made of twisted links of steel. The principal garment was the hauberk, or mail shirt, reaching from the neck to the knees. A stiff leather garment was worn under this to prevent the links from being driven into the warrior's body. Mail gloves and hose were worn. In its later and complete development the suit of armor was composed entirely of sheets of thin steel,

1.

2.

3.

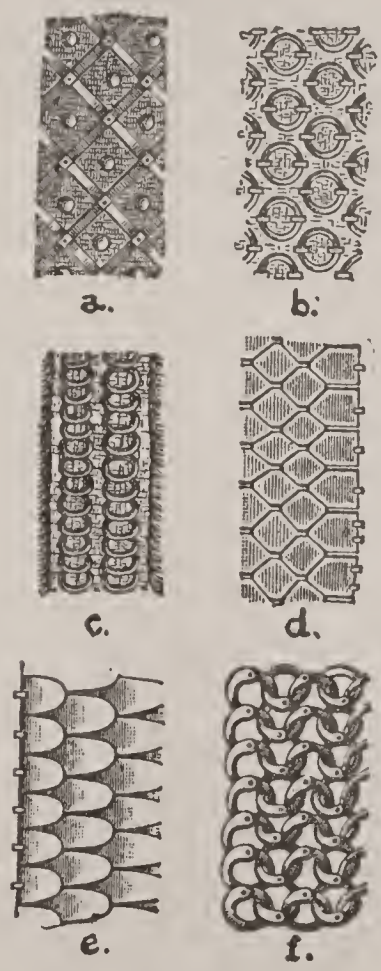
a. Steel cap.
b. Vizor.
c. Aventaile.
d. Throat piece.
e. Nape guard.
f. Neck guard.
g. Breast plate.
h. Back piece.
i. Skirt with thigh guards
k. Pauldron.

4.

l. Rivets.
m. Guards.
n. Armlets.
o. Cubitière.
p. Gauntlets.
q. Lance rest.
r. Cuishes.
s. Knee guard.
t. Jambes.
u. Solleret.
v. Tunic of mail.

5.

6.



a. b. c. d. e. f.

1. Carlovingian man-at-arms.
2. Polish knight, 16th century.
3. French warrior, about 1120.
4. Battle of Ascalon, 1099. (Stained glass in St. Denis.)
5 & 6. German armor—time of Maximilian I.
7. Various patterns of mail.—a. Latticed mail. b. Ringed mail. c. Chain mail. d. Tortoise mail. e. Scale mail. f. Chain mail.

ingeniously shaped, hinged, and riveted in such a way as to allow the arms and the legs to move freely. When the warrior donned his suit of armor and lowered the visor of his helmet, he was completely encased in metal, and was supposed to be proof against sword and spear. A knight clad in armor was supposed to be a match for any number of common men. A suit was so costly, however, that it could be owned only by the wealthy, who were thus given a great advantage over their fellows. A complete suit of armor was so heavy that the wearer could not mount his war horse without assistance, nor could he, if overthrown, rise without help. The development of archery, followed by the invention of gunpowder, which enabled men to fight at a distance, and made lightness of foot requisite to advantage in battle, rendered armor a useless incumbrance.

Numerous attempts were made during the World War to devise a light, metal armor that would protect, at least in part, the individual fighting man against rifle fire and the bayonet thrust. But, except for the light steel helmet—"tin hat," as the soldier quickly named it—no practical armor was devised although a steel breast plate was frequently used by the crews of German minnenwerfers, and by snipers. The steel helmet was introduced into the late war by the French after trench warfare was well advanced and it was found that many soldiers were receiving head wounds from pieces of shrapnel and from rifle bullets traveling at relatively low velocities. A considerable amount of prejudice had to be overcome before the soldiers would wear the helmets, the British and American helmet being slightly heavier, and the German type the heaviest.

See HELMET.

Armor Plate, sheets of metal designed to protect the hulls of ships against the missiles hurled by artillery. Some application of the idea seems to have been used in the War of 1812. Later in the Crimean War, three iron-clads were sent by France in 1855 to Alma, a Russian fort in the Crimea. Naturally enough, the projectile force of cannon was increased. During our Civil War a plate four and one-half inches thick was considered an efficient protection. A few years later the Krupps produced a rifle throwing a steel bolt, fourteen and one-half inches in diameter, that proved itself capable of piercing two twelve-inch plates separated by eleven inches of teak wood backed by five inches of teak and two one-inch plates,—a total protection of twenty-six inches of metal and fourteen inches of teak wood. It was then admitted that a war ship may be strengthened and its most vital parts defended, but that it would sink any ship to cover it with complete gunproof armor. The heaviest steel armor is now made in sections about a foot in thickness, nine feet in width, and eighteen feet in length. The outer surface is hardened. The plates are fastened in place by bolts, entering the inner surface only. Three and one-half per cent of nickel is added to the metal to secure toughness. A large battleship carries 8,000,000 pounds or more of armor. Modern projectiles will pierce any armor now made at a distance of a mile and a half or two miles; but the fact that a projectile is likely to strike at an angle and glance adds to the security of the ship. The principal American mills engaged in the manufacture of steel armor plate are those located at Pittsburgh and South Bethlehem, Pennsylvania. Also see BATTLESHIP; KRUPP; DREADNOUGHT; NAVY.

Armour, Philip Danforth (1832-1901), an American merchant and philanthropist, was born and educated at Stockbridge, N. Y. He engaged in the commission business in Milwaukee, Wis., and in 1863 became the head of the pork packing firm of Armour, Plankinton and Company in the same city. In 1870, the main office was transferred to Chicago, and the firm reorganized under the name of Armour and Company. This packing establishment prospered and still sends exports to every civilized country. It also does a large business in the refrigerator car service and in the storage and handling of grain. Mr. Armour was almost as well known for his philanthropy as for his business acumen. He founded in Chicago the Armour Mission and the Armour In-

stitute of Technology, giving them a total original endowment of $2,500,000.

Armour Institute of Technology, a scientific school of college grade founded by Philip D. Armour, in Chicago, in 1893. It was founded as a co-educational institution, but was later changed to a school for men. It offers courses in all branches of engineering, architecture, history, political science, philosophy, English composition, and literature. Its laboratories and shops have an exceptional equipment. In recent years the endowment has been greatly increased by J. Ogden Armour, son of the founder. In 1921-22 there were about 2,300 students and 70 professors and instructors.

Arms, weapons. We may suppose the first weapon to have been a fragment of stone thrown from the hand, or a branch wrested from a tree and used as a club. Later the stone was flung by means of a sling, and this missile was displaced by the lead or the steel bullet projected by an explosive, as powder. The modifications of the club are too numerous to trace. The mace, the sword, and the battle-ax may be regarded as weapons for blows given with the edge. The long leaf-shaped flint knife of primitive man had a keen edge and an artistic shape. Its descendants are the bronze and steel dagger, the poniard, and the bowie knife. The javelin, spear, and lance form still another class of weapons for blows given with the point. Preceding firearms, were the bow and arrow, the crossbow, and the arbalest. In contrast with artillery, all sorts of guns, the musket, arquebus, rifle, shotgun, carbine, pistol, derringer, and Colt's revolver, are called firearms. See FIREARMS; ARTILLERY; ARCHERY; GUNPOWDER; SWORD; SLING; ARMOR; ARQUEBUS.

Armstrong, Samuel Chapman (1839-1893), an American educator, born in Hawaii, in 1839, a son of Richard Armstrong, an American missionary to the Sandwich Islands. He came to the United States in 1860; he was graduated at Williams College in 1862, and in June of the same year he organized a company for the 125th Regiment of New York Infantry, and with it was assigned to the Army of the Potomac. At Harper's Ferry he was captured and held prisoner for three months. After the close of the war he was mustered out of the volunteer service with the rank of brigadier-general. During his service he volunteered for the command of a regiment of colored troops, with which he served for two years. In 1866 he took up the work of the Freedman's Bureau and at first had the oversight of the colored people in 10 counties of Virginia. After two years in this work he procured help from the American Missionary Association and personal friends in the North and founded a school which afterwards became famous as the Hampton Normal and Agricultural Institute. The United States Government, recognizing the great value of his work for colored youth here, began sending Indian youth to the Institute in 1878. General Armstrong served as president of the Institute until his death, May 11, 1893.

Armstrong, Sir Walter (1850-1918), a British art critic and writer, was born in Roxburgshire. On leaving the university he gained distinction as a writer on art, and his judgment and criticisms of pictures were looked upon as of great value. He was art critic to the *Pall Mall Gazette, St. James's Gazette* and Manchester *Gazette* from 1880 to 1892. In 1892 he became director of the National Gallery of Ireland, and held this position for twenty years. He was knighted in 1899. Among his chief writings are: *Gainsborough and His Place in English Art; Sir Joshua Reynolds; J. M. W. Turner; Sir Henry Raeburn; Art in the British Isles,* etc.

Armstrong, William George (1810-1900), an English inventor. He is the inventor of many improvements in hoisting apparatus, and other heavy iron machinery; also of a heavy gun for which he was knighted by the British government in 1858, and raised to the peerage in 1887. This gun is neither more nor less than a rifle of great strength and large caliber. Bars of wrought iron, about two inches in width, are raised to a white heat and then twisted, spirally, around a cylindrical steel core. A second layer of heated bars is then twisted outside of the others in an

opposite direction; a third layer outside of this, and so on, until any desired thickness has been obtained. The whole mass is then heated to a white heat and forged with a steam hammer. Two or more sections of this sort, about three feet in length, are then sawed off square at each end, brought together under intense heat, and surrounded by large rings to secure the joint. The steel core within is then removed, and the barrel of the gun is bored smooth and rifled with forty spiral grooves. An Armstrong weighing ten tons throws a thirty-two pound bullet five miles. At a distance of two miles a gunner is expected to hit a target nine feet square nine times out of ten, not bad shooting for a rifle. The strength of this gun in proportion to its weight renders it possible to use heavy charges of powder without danger of bursting. See ARTILLERY.

Army, in military affairs, a large body of men trained and armed for war. In most civilized countries, all able-bodied men, excluding youths under eighteen and men over forty-five or fifty, are due for military service in case of need. A comparatively small number of men resident in barracks constitute a standing army, to be increased in case of actual war. In a few nations, as among the ancient Egyptians and the people of India, the warriors constituted a distinct class. The Israelites also excused the Levites from military service. Formerly many of the larger European nations required every physically fit young man to serve an apprenticeship of several years in the army, and to hold himself in readiness thereafter when called upon. England and the United States rely upon permanent standing armies composed of men enlisted for a term of years. In case of actual war, volunteers are called for. In case a sufficient number cannot be enlisted in this way, an enforced enlistment, or draft, is resorted to. For this purpose the names of the able-bodied are placed on slips of paper in a box, and those whose names are drawn at random are required to serve.

The post war status of the armies of the nations that engaged in the World War is as follows:

United States	165,252
Great Britain	277,023
France	390,000
Italy	250,000
Belgium	100,000
Russia (estimated)	1,595,000
Japan	300,000
Rumania	230,000
Jugoslavia	150,000
Greece	200,000
Portugal	35,000
Germany	100,000
Austria	34,000
Hungary	35,000
Bulgaria	20,000
Turkey	100,000

The strength of almost every army in the world was greatly enhanced during the World War, when it was found necessary, in many countries, to resort to successive drafts upon the male population to maintain the necessary fighting strength. In modern warfare, as great an army is needed behind the firing line as on it. This is especially true of armies that are moving and yet must maintain contact with their bases of supply.

At the end of August, 1921, the strength of the army was 165,252 men.

Army of the United States, The. By act of Congress of February 2, 1901, the enlisted strength of the army was not to exceed 100,000. For the year 1910-11, the actual strength was about 92,000. The army consisted of 15 regiments of cavalry, 30 batteries of field artillery, 30 regiments of infantry, 3 battalions of engineers, with the addition of scouts, 1 regiment in Porto Rico, and 50 companies of native scouts in the Philippines.

By order of the War Department in August, 1918, the regular army, reserve corps, national guard, national army, etc., were merged into one great body to be known as the United States Army. On November 11, 1918, the United States had in France 41 complete divisions, exclusive of the negro division which was in course of organization. The grand total of men in these divisions was 1,975,000, of whom 750,000 were combatant troops. In addition there were air forces, heavy artillery, and independent engineer troops not attached to these divisions, and many thou-

sands were at ports of embarkation ready to sail when the Armistice was signed. It may be said that 1,000,000 combatant American troops were ready for the Allied offensive against the Germans at this time. American casualties two weeks preceding November 11, 1918, totaled 236,117.

ORGANIZATION. Under the constitution the President is commander in chief of the army and navy and Congress has power to raise and support armies. It has always been the policy of the United States to maintain in times of peace as small a standing army as possible, consistent with the safety of the nation. The rank and file of the army is composed entirely of enlisted men.

The General Staff Corps, consisting of 55 officials detailed to it, is the chief military advisory board to the President and the Secretary of War. The head of this corps is known as the chief of staff of the army. The work of the staff is divided among a number of staff bureaus, or departments, such as the Adjutant General's Department, the Inspector General's Department, the Quartermaster General's Department and the Judge Advocate General's Department.

The army is divided into four principal combatant branches, i. e., infantry, cavalry, artillery and air service.

Infantry. The samllest unit in the infantry is the squad, consisting in rifle companies of a corporal and 7 privates. The next higher unit is a section consisting of half a platoon, commanded by a sergeant. The platoon consists of six squads commanded by a lieutenant.

The rifle company is usually made up of about eighteen squads or three platoons. The officers of a company are a captain, two 1st lieutenants and three 2d lieutenants. The machine gun company consists of four officers and 141 men. Three rifle companies and the machine gun company are joined to form a battalion.

The regiment consists of three battalions. There are also three additional companies not belonging to any battalion. They are headquarters company, and the service company, which includes the band. The regiment is considered the most important combatant unit in the army organization and it is the unit that especially appeals to the soldier's pride and loyalty. Two regiments form a brigade. Brigades are joined to form divisions, which are united to form corps, which are joined to form a field army.

Cavalry. A troop of cavalry at war strength consists of 120 men and 3 officers. Four troops form a squadron. Three squadrons, a headquarters troop, a machine gun troop and a service troop form a regiment and three regiments form a brigade.

Artillery. The battery is the smallest unit in the artillery and it varies in the number of men and guns according to the branch of artillery to which it belongs. A battery of field artillery at war strength consists of 4 officers, 146 men, and 4 guns. Three batteries form a battalion and two battalions form a regiment. Two regiments and ammunition train form a brigade. A field artillery brigade at war strength has 169 officers and 3,227 men.

COMMISSIONED AND NON-COMMISSIONED OFFICERS. Each company has commissioned and non-commissioned officers. Commissioned officers hold their authority by a commission authorized by the President and confirmed by Congress. All officers from 2d lieutenant to general are commissioned officers. Sergeants and corporals of the various grades are non-commissioned officers. They are appointed by the commanding officers of their regiments. Warrant officers form a grade between the commissioned and non-commissioned officers. They exercise authority by virtue of a warrant granted by the President. Warrant officers receive the base pay and allowances of a 2d lieutenant.

AREAS. The United States is divided into nine army corps areas, each in command of a major-general, with a general of the army as ranking officer over all. The headquarters of the areas are:

First Corps Area, Boston; Second Corps Area, Governor's Island, New York; Third Corps Area, Fort McHenry, Maryland; Fourth Corps Area, Fort McPherson, Georgia; Fifth Corps Area, Fort Benjamin Harrison, Indiana; Sixth Corps

Area, Fort Sheridan, Illinois; Seventh Corps Area, Fort Crook, Nebraska; Eighth Corps Area, Fort Sam Houston, San Antonio, Texas; Ninth Corps Area, the Presidio, San Francisco.

Army-Worm, the caterpillar of a dull brown nocturnal moth. The larvae take the name from a habit of marching from field to field in a host. The full grown caterpillar is about an inch and a half long, and is marked with green, black, and yellow stripes. It may be found almost anywhere east of the Rocky Mountains, but attracts attention only in years of unusual prevalence. If taken in time, a colony may be extinguished by spraying with Paris green. About the only way to stop the army-worm when on the march is to dig a shallow ditch, steep on the far side, with pits here and there. The "worms" follow the steep edge seeking a chance to climb up, and fall into the pits, where they may be taken by the bushel. Instances are not uncommon of fields of grain and of orchards destroyed by army-worms, but birds and parasites prevent their becoming a dangerous pest. See Insects.

Ar'nica, a genus of plants half way between daisies and sunflowers. There are three species in the eastern part of the United States, and at least four in the Rocky Mountain region; but the arnica of the druggist is extracted from a European plant ranging over the mountains and meadows of the continent from Portugal to Scandinavia. It is called mountain arnica, and mountain tobacco. The plant is perennial, with a stem two feet high, few leaves, and a head of dark golden flowers. Tincture of arnica is a sovereign liniment for bruises and was given formerly as a remedy in cases of paralysis and typhoid fever.

Ar'no, a river of Italy. Like the Tiber, it rises in the Apennines. After a course of 140 miles, it empties into the Mediterranean halfway from Rome to Genoa. The ancient city of Pisa, with its leaning tower, is situated near the mouth of the river. Florence, with its wonderful bridges, cathedrals, and treasures of art, is situated in the fruitful upper valley of the Arno. The valley of the Tiber is the native seat of Roman law and is the home of the Roman Church; but Italian art, literature, and nationality sprang to life in the charming Val d'Arno.

Arnheim, or **Arnhem,** Holland, capital of the province of Gelderland. It is situated on the right bank of the Rhine, a distance of 35 miles from Utrecht. Its situation is one of the most picturesque in Holland. The city is surrounded by ramparts, erected by the Romans, and these surround the older portion of the city, and have been made into fine promenades. It has many fine old buildings, some of which were built in the 15th century. Population, 1920, 70,714.

Arnold, Benedict (1741-1801), an American soldier. He was born at Norwich, Connecticut, January 14, 1741. At the beginning of the Revolutionary War he was a colonel in Ethan Allen's force that captured Ticonderoga. He was with General Montgomery in the assault on Quebec, and was wounded. Later he received the rank of brigadier-general as a reward for his soldierly conduct. He took a brave part in the battle of Saratoga. In 1780 he was placed in command of Philadelphia. During the winter, he married a well known lady, but fell into dissipation. He was court-martialed, and was reprimanded by General Washington for official misconduct. Whether he despaired of the American cause and thought he might as well make terms with the enemy, or whether he was led astray by vindictive feelings and a desire for revenge, will never be known; but, in spite of his record for patriotism, he entered into treasonable correspondence with the British commander-in-chief. He asked for the command of West Point, a request which Washington, hoping to conciliate a brave soldier, was glad to grant. Sir Henry Clinton agreed to give Arnold, it appears, $30,000 and a commission in the British army for the surrender of this important post. The story of the negotiations conducted through Major André, the latter's arrest and execution as a spy, and Arnold's flight down the Hudson to New York is well known. Arnold was given a British

colonel's commission, and in September, 1781, he led an expedition which captured Fort Griswold and burned New London in his native state.

At the close of the Revolutionary War Arnold retired to London. It is said that he was shunned and despised by all ranks of society and that he died, June, 1801, a wretched outcast,—a man, literally, without a country. His character is not understood readily. It is difficult to suppose that his early toil, daring, and bravery in the American cause were due to mere love of adventure. It is equally difficult to understand how a sincere patriot, even though he felt himself censured severely for a trivial fault, could have turned against his native country, or have led a marauding band to lay waste, with fire and sword, the scenes of his childhood.

In a skirmish in Virginia he is said to have taken two American prisoners. To one of them he put the question, "If the Americans should catch me, what would they do to me?" The soldier replied promptly, "They would bury with military honors the leg which was wounded at Saratoga, and hang the remainder of you upon a gibbet." In this terse reply the frontiersman gave a verdict which the historian still accepts.

See ANDRÉ; WEST POINT.

Arnold, Sir Edwin (1832-1904), an English poet and Orientalist. While the author of several works, his fame rests upon one, *The Light of Asia, a Poetic Presentation of the Life and Teaching of Gautama.* Gautama is the family name of Buddha.

QUOTATIONS FROM "THE LIGHT OF ASIA."

The foolish ofttimes teach the wise.

What good I see humbly I seek to do
And live obedient to the law, in trust
That what will come and must come
Shall come well.

Making all futures fruits of all the pasts.

Lo! as the wind is, so is mortal life
A moan, a sigh, a sob, a storm, a strife.
Pity and need
Make all flesh kin, there is no caste in blood.

Arnold, Matthew (1822-1888), an English man of letters. He was a son of Dr. Thomas Arnold, the famous head master of Rugby. He was educated at Oxford. He taught for a time in his father's school and held various government positions. In 1851 he was appointed an inspector of schools, a position which he held until 1883, when he retired on a pension of $1,250. During his inspectorship he visited the schools of France and Germany. He delivered lectures at Oxford University, and in 1886 he visited the United States, where he delivered a series of critical lectures in the principal cities. Of his poems, *Sohrab and Rustum* is best known. Arnold is at his best as a writer of critical essays. In these he attacked British "Philistinism." His most noted volumes are *Culture and Anarchy, Literature and Dogma, Essays in Criticism, Mixed Essays,* and *Discourses in America.* The following quotation defines Arnold's attitude:

> The people who believe most that our greatness and welfare are proved by our being very rich, and who most give their lives and thoughts to becoming rich, are just the very people whom we call Philistines. Culture says: "Consider these people, then, their way of life, their habits, their manners, the very tones of their voice; look at them attentively; observe the literature they read, the things which give them pleasure, the words which come forth out of their mouths, the thoughts which make the furniture of their minds; would any amount of wealth be worth having with the condition that one was to become just like these people by having it?" And thus culture begets a dissatisfaction which is of the highest possible value in stemming the common tide of men's thoughts in a wealthy and industrial community, and which saves the future, as one may hope, from being vulgarized, even if it cannot save the present.

Arnold of Winkelried, a heroic peasant of Switzerland. According to Swiss tradition he was a native of Unterwalden. At the battle of Sempach, 1386, the Austrians formed in a solid phalanx against the Swiss, who were unable to break through the forest of spear points. Arnold, seeing no other way, rushed up and gathering an armful of spears in his own breast, bore them aside. His countrymen rushing in through the gap thus formed put the Austrians to flight. Switzerland was again safe from foreign invaders. Mothers taught their children to honor the name of Arnold. For centuries the Swiss sentry pacing his lonely round called

out at the appointed hour of his watch, "All is well, remember Arnold of Winkelried." As in the case of William Tell, historians reject the story as legendary. There is no more reason for believing in the Swiss Winkelried than in the Greek Hercules. See TELL; SWITZERLAND.

Arnold, Thomas (1795-1842), an English scholar and educator. He was educated chiefly in the public school of Winchester and at Oxford University. He prepared himself for the ministry of the Church of England, but received an appointment as a fellow of Oriel College and made a reputation by preparing young men to enter the university. In 1828 he was made head-master of Rugby School. He is known chiefly by his remarkable work in that institution. He was considered liberal in his views. He favored the introduction of scientific and historical subjects, without, however, displacing the classics, for the teaching of which Rugby was noted. The graduates of the school carried off prizes in the universities and Arnold's reputation became very great. Dean Stanley, one of his old students, edited *The Life and Correspondence of Thomas Arnold.* Thomas Hughes' *Tom Brown at Rugby* gives an excellent view of Rugby and Dr. Arnold at their best.

Aroostook, a-rōōs'tŏŏk, **War,** a name given to a long-continued dispute concerning the boundary line between New Brunswick, Canada, and Maine. The name Aroostook was given to the quarrel from the Aroostook River which runs through this territory, and near which the militia of Maine took their stand when matters reached a crisis in 1839. The disputed territory comprised some 12,000 square miles, including the district from the source of the St. Croix River to the watershed between those streams flowing to the Atlantic Ocean and those flowing to the St. Lawrence River. Maine had issued a call for 10,000 men in addition to the 1,800 militia already on the ground, New Brunswick had taken up arms and Nova Scotia had voted aid, when Gen. Winfield Scott took the matter to President Van Buren and a commission was appointed. The Ashburton, or Webster-Ashburton Treaty, giving New Brunswick 5,000 square miles of the territory under dispute, and Maine, 7,000, was framed by Daniel Webster for the United States, and Alexander Baring, afterward Lord Ashburton, for Great Britain. This treaty was ratified by the United States Senate, and the matter settled thus amicably in 1842. When the survey provided for in this treaty was made, several supposedly American towns were found to be on New Brunswick soil.

Arquebus, är'-kwe-bus, spelled also *Harquebus.* The earliest form of the musket. An earlier firearm was set off by means of a match applied to the priming. It was difficult for a soldier to apply his match and to take aim at the same time. The arquebus added an improvement suggested, it is said, by the arbalest or crossbow. The burning match was brought down to the priming by pulling a trigger when aim had been secured. This was about 1476. The Germans are credited with the invention of a bent stock, which enabled the musketeer to take better aim. These old muskets were exceedingly heavy, clumsy affairs. When engaged in battle, the musketeers advanced to the front, rested their arquebuses in crotches carried for the purpose, discharged their pieces, and then retired behind their comrades, the pikemen, and reloaded their guns with infinite labor. See FIREARMS.

Arrack, an oriental drink corresponding to western whiskey. It is made by fermenting and then distilling the juice of the cocoanut, date, and other palms. It is also made from rice by malting, fermenting, and distilling, as for whiskey. The genuine arrack of Ceylon and India is made from palm juice only. In Jamaica it is made from fermented rice liquor. The liquor obtained by the first distillation is strengthened by passing it through the still a second and a third time. Arrack contains on an average about 52 per cent of alcohol. It is used throughout a greater extent of territory, and by more people, than whiskey, being well known to the nations of South America, Africa, India, the Pacific islands, and in the East

generally, including Japan, where it is known as *saki*. It is also imported into Europe. See ALCOHOL.

Arrhenius, ar-rē′nĭ-us, **Svante,** one of the most distinguished chemists of the time. He was born in Sweden in 1859, and received the degree of doctor of philosophy at the age of nineteen from the University of Upsala. He has worked largely in the field of physical chemistry, having occupied the chair of physics in Stockholm since 1895. His treatises in this chosen field are numerous, the best known perhaps being his theory of solution, and his commonly accepted explanation of comets' tails as due to repulsion on approaching the sun. He was the recipient of the Nobel prize in chemistry in 1903. See NOBEL.

Arrow. See ARCHERY.

Arrowroot, a starch much used for food. This food starch is obtained from a number of tropical plants, but the genuine arrowroot is made from a West Indian species that has spread to other tropical countries. The arrowroot plant grows about two feet high. It bears white irregular flowers and berries about the size of currants. Each plant produces an underground cluster of scaly white root-stocks which, when mature, yield one-fourth of their own weight of a fine starch. It is valued as a table delicacy for puddings, etc., and as food easily digested by children. Arrowroot may be prepared in small quantities by washing, peeling, pounding, and mixing with an abundance of water. Water takes up the starch, the fiber is then strained out, and the water is allowed to stand. After the starch settles the water is drawn off. The starch is then dried and is ready for use. On a large scale these operations are carried on with mills and vats and drying pans, but the general principles are the same. St. Vincent, one of the Windward Islands, exports a large quantity of arrowroot. Great Britain imports 400,000 pounds of arrowroot a year. See STARCH; SAGO.

Arsenal, a storehouse or factory for making, repairing, or keeping government arms, ordnance, and munitions of war. Governments very frequently purchase guns, bayonets, sabres, and other needful articles from contractors; yet all considerable governments maintain arsenals. The chief arsenals of the United States are at Allegheny, Pa.; Augusta, Ga.; Benecia, Cal.; Columbia, Tenn.; Fort Monroe, Va.; Indianapolis, Ind.; Kennebec, Me.; New York, N. Y.; Rock Island, Ill.; San Antonio, Tex.; Watertown, Mass.; and Watervliet, N. Y., with powder depots at St. Louis, Mo.; and Dover, N. J. There is a noted armory at Springfield, Mass., and a proving ground for cannon at Sandy Hook, N. J. Of foreign arsenals, the most noted is that at Woolwich, England, founded in 1720. The French arsenals are at Cherbourg, Brest, Lorient, Rochefort, and Toulon. There are German arsenals at Spandau, Cologne, and Dantzig. The chief Austrian arsenal is at Vienna; that of Russia at St. Petersburg, and of Italy at Turin.

Arsenic, a chemical element having a grayish white color and a metallic luster. It is widely distributed throughout the world in very small quantities. It occurs usually in union with iron, silver, nickel, cobalt, or antimony. Its commercial preparation is confined chiefly to Bohemia, Saxony, and England. One smelter, at Everett, Washington, ships thirty-five tons a week to the New York market. In bulk it is worth eighty dollars a ton. Arsenic is obtained from crushed arsenical ore by roasting in carefully glazed earthen ovens. It vaporizes at a temperature of 356°F. and is collected in crystals. The free element arsenic is little known; the white powdered arsenic of the drug store is a compound with oxygen. It is a deadly poison, and was known to the ancients. The terrible crimes imputed to the Borgias of the Middle Ages were effected by means of arsenic.

In case of arsenical poisoning the antidotes most likely to be at hand are milk, flour and water, or the white of an egg and water, the coagulating of which tends to entangle the particles of poison and sweep them out of the stomach. Arsenic is used freely by taxidermists in rendering bird skins safe against the attack of insects. Under the name of ratsbane it

has long been sprinkled on bread and butter or similar articles of food to clear premises of rats and mice. Paris green and Scheele's green are compounds of arsenic with copper. The arsenic vapor which escapes from copper smelters settles to the ground and injures vegetation for miles around. This nuisance has been abated recently by improved methods of smelting.

Arsenic may be taken in minute quantities seemingly without injury. The women of certain districts of Hungary and Switzerland are said to take arsenic to whiten the complexion. By beginning with infinitely small amounts the dose may be increased beyond the dose customarily regarded as fatal. Workmen in arsenic plants rub their faces and necks with fine clay, lest, when they perspire, the open pores may absorb an over amount of the deadly powder.

See POISON; PARIS GREEN; SPRAYING.

Arson, the willful and malicious burning of a house or building belonging to another. If the death of an inmate be caused by such malicious action, the perpetrator is guilty of murder, and may be punished for taking life. Malicious setting fire to a house or building in which there is a human being at the time, is arson of the first degree. The state of New York, whose laws have been adopted in many states, punishes arson in the first degree by any term of imprisonment up to forty years; in the second degree by a term of not exceeding twenty-five years; and for the third degree by a term not exceeding fifteen years. An attempt to set a fire, providing it goes so far as to char or consume the slightest portion, is arson.

Ars Poetica, a discourse on poetry by the Latin poet, Horace. See HORACE.

Art, in its broadest sense, designates everything which we would distinguish from Nature. All things in the creation of which man has had no part, may be comprehended under the term Nature, while the term Art includes all things which in any sense owe their existence to man. In a somewhat narrower use a distinction is made between science and art. Science is knowing, Art is doing. In a still more specific use the word Art designates the fine arts as distinguished from the useful, mechanical, or industrial arts. The fine arts are those which have to do with the production of the beautiful, of that which appeals to the taste and imagination. They include painting, sculpture, architecture, music, and poetry. The useful arts may produce the beautiful but their primary object is to produce the useful. In common usage the word Art has been still further narrowed until it often designates painting and sculpture only, or even painting alone. See ARCHITECTURE; PAINTING; SCULPTURE.

Artemis, är′tē-mĭs. See DIANA.

Artemisia, a genus of acrid, bitter, composite plants, so named by Linnaeus. The genus is named for Artemisia, the queen of Caria, who built the famous Mausoleum at Halicarnassus. The wormwood, the southernwood or oldman, the mugwort, and the sage bushes of the alkaline plains are all related species. An exceedingly bitter, greenish, highly aromatic French liqueur, called absinthe, is produced by steeping wormwood in alcohol and then redistilling. Its excessive use produces vertigo and epilepsy. An alpine artemisia furnishes a yellow dye. The distillation of wormwood oil is carried on in several states of the Union, notably New York, Michigan, Nebraska, and Wisconsin. The shrub is cultivated in rows like corn. The shoots are cut for distillation several seasons in succession. The oil is a dark greenish heavy oil. The yield does not exceed ten pounds of oil to the acre. See ABSINTHE; SAGEBRUSH.

Artemus Ward. See BROWNE, CHARLES FARRAR.

Artery. See CIRCULATION.

Artesian Wells, self flowing wells. Named from Artois, France, where deep wells were sunk at an early date. The oldest was sunk in 1126. Although the term is applied in America to any well of great depth, it is applied more correctly only to wells from which a stream of water flows. The water comes from a stratum of sand or gravel exposed to rainfall on higher ground, perhaps a thousand miles away. Water falling on such a stratum, possibly

where it is upheaved in a range of mountains, follows it underground, unable to escape upward or downward. When tapped by an artesian well, it rises by reason of pressure toward the level of the highest part of the watersoaked stratum. The flow of the well may be copious at first, owing to an accumulation of imprisoned water, but its permanent flow is dependent on the rainfall or melting snow on the distant outcrop. The more artesian wells in a given locality, the more likely they all are to fall off in supply.

Ancient artesian wells have been found in Egypt. There are artesian wells in Italy, Germany, Spain, the Sahara, and in China. London and Paris are situated over artesian basins. A well near Leipsic, the deepest in the world, goes down 5,735 feet. Many artesian waters are wonderfully pure, others are strongly mineral. The Chinese make salt from the brine of deep wells thousands of years old. A well at St. Louis, 2,200 feet deep, is so charged with a sulphurous odor as to be useless for household purposes. Artesian wells are numerous along the Atlantic coast of the United States, deriving their waters, doubtless, from the Appalachians. One of the most noted of these at Charleston, South Carolina, is 1,250 feet deep. A well at Louisville, Kentucky, over 2,000 feet deep, yields 10,000 barrels of water daily. In the Great Plains rrom North Dakota to Texas are the greatest artesian regions known. The wells derive their water, no doubt, from rainfall on the western highlands. In many locations in South Dakota, Iowa, Kansas, Colorado, Montana, and Texas, the flow is sufficient to be of aid in irrigation. Galveston, Texas, has a fine well 3,000 feet deep.

Artful Dodger, The, a name applied to John Dawkins in Charles Dickens' *Oliver Twist.* He is represented as a young pickpocket employed by Fagin, the Jew. He was so expert that the sobriquet was used almost to the exclusion of his rightful name.

Arthur, a British chieftain of the sixth century. The name of King Arthur is the most famous of any in British traditions. He is the central figure in the legendary history of the island. So many stories grew up about his name that, when effort was made to separate fact from fiction, doubt arose whether King Arthur himself were a real hero or only an invention. It is beyond reasonable question, however, that such a king lived and won victories, reverence, and affection. Arthur is held to have been prince of the Silures, a tribe of Britons, in South Wales. He was the son of Uther, called Pendragon. He came to the sovereignty about 510. He overcame the Saxons in twelve battles. He then reigned in peace for about twenty years, until his nephew Modred revolted. Arthur was mortally wounded in the battle of Camlon, Cornwall. He was taken by sea to Glastonbury, and there died and was buried. About 1150, by command of Henry II, the grave said to be Arthur's was opened. In it were found the monarch's bones and his sword. Upon a leaden cross let into the stone were the words, "Here lies buried the famous King Arthur, in the island Avalonia."

These are the accepted facts of Arthur's life and death—all that are known. As to the traditions, they are almost innumerable, many of them being still current among the peasants of Somersetshire and Devonshire, England. That they centered around this one figure may be due less to the real character of Arthur than to the fact that the people were ready for a hero. The hope and confidence Arthur's victories and just reign had inspired were quenched in his defeat and death, but this hero worship softened the disappointment. Among his people in the mountains of Wales, and across the channel where many Britons had fled from the encroaching Saxons, the stories of Arthur's prowess were told and retold. The vivid imaginations of these primitive people endowed him with every beauty, and credited him with every noble deed of which they heard or which they could invent.

Stories of supernatural occurrences, readily believed in that superstitious age, were interwoven with the other tales until this "hero of a vanquished race" became a demigod. In these stories, Arthur's birth

and death are shrouded in mystery. One oft repeated tale was that, as an infant, he had come in from the sea riding on a great wave. At the time of his election to the sovereignty, a miracle had pointed to him as king. Miracles attended his coronation. The wisdom ascribed to him as a ruler was only equaled by his power as a warrior. Tennyson's Lancelot says to Arthur, "The power of God descends upon thee in the battlefield," and it is evident that a widespread belief existed that Arthur received supernatural aid in combat. The knights of Arthur's Round Table shared in his glory. Their deeds of prowess against the Saxons and in single combat against those who wronged the innocent and wrought evil in the land, are only second to those of Arthur himself. Their loyalty to their king and his influence over them is a marked feature of the legends. In the "last great battle of the west" Arthur was wounded and borne away, but it was long believed that the prophecy was to be fufilled, "He passes and is healed and cannot die." As the peasants of the Hartz Mountains long expected Barbarossa's return, so Arthur's people in Wales and Brittany believed that he would come again to reign over his people.

It is impossible to appreciate fully or even to conceive the influence which this "ideal knight" has had in the development of the race. Some little idea of it may be obtained by tracing the Arthurian legends and their offshoots in literature. In the history of civilization there are instances, and this is one, where the ideal is a more real thing than the real itself. For a thousand years these stories furnished important literary material. As early as the eighth century, Nennius, a British monk, wrote in Latin an account of the wars of Arthur. Geoffrey of Monmouth in the twelfth century wrote a Latin *History of the Kings of Britain,* claiming to get his material from a "very old book in the British language," brought from Brittany. In this he told the tale of King Arthur. Wace wrote it in French. Layamon, an English priest, had Arthur in mind when he wrote his *Brut.*

While the age of chivalry was in full flower, the stories and ballads of King Arthur and his knights were told and sung in courts and castles throughout all Europe. In the fifteenth century, Sir Thomas Malory wrote the story in English prose, which he called *Morte d'Arthur,* or the Death of Arthur. Dante, Ariosto, and Tasso in far away Italy, and Hans Sachs, the shoemaker poet of Nuremberg, used the King Arthur legends freely. Spenser's pictures of knightly courtesy and maidenly need in the *Faerie Queene* are drawn from the tales of the Round Table. Their influence may be traced in the writings of Chaucer, Scott, Schiller, Shakespeare, Dryden, Milton, and many others. Lady Charlotte Guest's translation of the *Mabinogion,* or Welsh Tales, in 1838-49, created a new interest in these early romances, which has extended to America. Lowell has probably given us the most popular example of a poem inspired by these stories. His *Sir Launfal* is clearly one of Arthur's Knights. Of all the poets, Tennyson has given the legends their most fitting expression. His *Idylls of the King* would seem to be their final setting. Not until the world grows older and changes its way of looking at things, not until the language of Tennyson becomes antiquated, will there be an opportunity even for a master mind to rewrite the doings of Arthur and the knights who sat at his table, fought by his side, and rode their rides of knightly daring.

See TENNYSON; GEOFFREY OF MONMOUTH; MABINOGION; IDYLLS OF THE KING; BRUT.

King Arthur is more than a shadow; his name is carved upon the corner-stone of our civilization.—J. Loughran Scott.

As to Arthur, more renowned in songs and romances than in true stories, who he was, and whether ever any such reigned in Britain, hath been doubted heretofore, and may again, with good reason.—Milton.

King Arthur is the embodiment of those higher qualities that marked the ambition of the people.

Arthur, Chester Alan (1830-1886), the twenty-first president of the United States. Born at Fairfield, Vermont, October 5, 1830. Died in New York City,

November 18, 1886. He was a graduate of Union College, and a practicing lawyer in New York. During the Civil War he was a quartermaster general. In politics he was a supporter of the *Stalwarts* and Roscoe Conkling. In 1880 he was nominated and elected vice-president, and upon Garfield's assassination took oath of office for the presidency. President Arthur was a candidate for the nomination in 1884, but was defeated by Mr. Blaine. His administration was eminently respectable, intelligent, and free from partisanship. See GARFIELD; PRESIDENT.

Arthur's Seat, a hill in the vicinity of Edinburgh. It rises to a height of 822 feet above the sea, and commands a fine view of Edinburgh and the ocean. On two sides the hill presents vertical walls Some prominent veins of basalt are popularly known as "Samson's Ribs." "The Queen's Drive" winds easily to the top. A fine footway along the west side is thus mentioned by Walter Scott: "This path along the Salisbury Crags used to be my favorite evening and morning resort when engaged with an author or a new subject of study." It has been superseded by a drive. Arthur's Seat and its immediate vicinity are associated with Scott's *Heart of Midlothian* and "Jeanie Deans." See SCOTT; EDINBURGH.

Artichoke, a name given to two very different, coarse, composite plants. The European or French artichoke is a coarse thistle-like plant with blue and white flowers. Portions of the large flower heads are pickled, cut for salads, or cooked and served like cauliflower. The globe variety is popular in the United States, chiefly in the milder climate of the south. The Jerusalem artichoke is a broad-leafed, coarse, wild sunflower, native in Canada and the upper Mississippi Valley. The tuberous roots were collected by the Indians for food. It has been introduced into some parts of Europe. In America artichokes have value as stock food. The tubers are fed chiefly to hogs. On the same principle that grain is scattered in straw to give hens the exercise of scratching, artichokes are planted in hog pastures for the pleasurable exercise they afford the hog in rooting, as well as for the small amount of potato-like food they supply.

Articles of Confederation, a document drawn up in 1776 by a committee from the Continental Congress, an assembly of deputies from the thirteen colonies. They were called "Articles of Confederation and Perpetual Union," were submitted to Congress, and were ratified by every one of the thirteen states. According to these articles each state had one vote in Congress, and nine states must give their approval in order that an act might pass. Congress could make recommendations to the various states but had no power to enforce such recommendations. No courts were provided for. The weakness and incompleteness of these Articles was apparent as soon as they went into effect, and in 1787 a convention of fifty-five members representing twelve states and presided over by Washington, drew up the Constitution of the United States, which by 1790 had been ratified by the thirteen states. See CONSTITUTION.

Articles, The Thirty-Nine, the articles of faith of the Church of England. The Articles constitute the body of divinity, the theological tenets of the Anglican Church. The Articles are the result of various drafts. These are founded on forty-two articles drawn up by Archbishop Cranmer in 1551. They were finally adopted, thirty-nine in number, in 1571. The subscriber professes a belief in the doctrine of the Trinity, in apostolic succession, in the Nicene creed, in the sacraments of the Lord's Supper and baptism, in predestination, and in the supremacy of the king. Certain articles reject the doctrine of purgatory and condemn the celebration of mass. The thirty-second article permits the clergy to marry. All the clergymen of the Episcopal church, both within the British Empire and in America, must accept the Thirty-nine Articles. Students desiring to enter Oxford or Cambridge Universities were required formerly to subscribe to the Articles. This rule was abolished during the reign of Queen Victoria. See CATECHISM.

Artillery in its broader sense includes all guns which cannot be fired from the

shoulder. There is some reason to believe that cannon were invented by the Chinese, and were used by the Saracens. The first authentic record of the use of artillery is in the account of the battle of Crecy in 1346. The cannon which were used by the English in that battle were made of iron bars which were bound together with hoops. The development of artillery was slow until the nineteenth century, but it has been rapid in the past fifty years. The guns which comprise our modern artillery vary, in size, from the 37 mm. (about 1.5 in.) to the 16-inch guns of our coast defense fortifications. Even larger guns have been developed but they have not come into general use. During the World War the Germans fired into Paris from a range of seventy-one miles.

Some of the most famous guns of the present day are the "French 75" and the Krupp Howitzers. These guns are the result of the invention of powerful explosives, recoil mechanisms to absorb the shock of the explosives, and the process of "Nesting" tubes to form the barrel of the gun. This last mentioned process greatly increases the strength of the gun without a proportional increase in the weight.

Artillery is divided into two general types: the guns which deliver a high velocity, flat trajectory fire; and the howitzers which deliver a low velocity, curved trajectory fire. In other words, the gun "throws" the projectile almost on a direct line to the target, while the howitzer "tosses" the shell high in the air and lets it fall on the target.

Under our present organization these guns are divided among three branches of the Army. The 37 mm. and the "Stokes Mortar" are assigned to the Infantry. The 2.95 in. (Mountain Gun), the 75 mm. gun (3 in.), the 155 mm. Howitzer (6 in.), and the 240 mm. Howitzer (9 in.) are assigned to the Field Artillery. The larger guns are manned by the Coast Artillery Corps. The guns which are assigned to the Field Artillery are those which can be transported rapidly enough to keep up with the mobile army. The mobility of the larger guns, such as the 155 mm. and the 240 mm., has been greatly increased by the development of the tractor; and this development has made possible their employment as field artillery.

The increased range and accuracy of these new guns, and the development of new methods to control their fire has more than doubled the usefulness of artillery in supporting an infantry attack. This fact became apparent in the early part of the World War and the proportion of artillery to infantry in modern armies has been greatly increased.

Arundel Marbles, or **Oxford Marbles,** a collection of ancient sculptures and inscribed stones, the possession of the University of Oxford. The original collection, only a portion of which bears the name of Arundel or Arundelian marbles, was founded by Thomas Howard, Earl of Arundel and Earl Marshal of England (1592-1646), who by travel and residence in Italy had acquired a strong taste for works of art. He employed agents to make collections of antiquities in Greece, Italy and Asia Minor, and they purchased for him and brought to England in 1627 the marbles which now bear the earl's name. They had been found on the island of Paros about 1610, the original collection consisting of 37 statues, 128 busts and 250 inscribed stones. The collection was preserved in Arundel House, but during the disturbances attendant upon the reign of Charles I and the Protectorate, the house was at times deserted, many of the marbles were stolen, others defaced, and still others adapted to the uses of ordinary architecture. At the death of the earl the collection was divided, the inscribed marbles, by far the most valuable part of the collection, falling to the elder son, and ultimately through his son, Henry Howard, coming into the possession of Oxford University. The most valuable piece in the collection is the one bearing the Parian Chronicle. It is a large oblong slab of Parian marble, and bears, inscribed in capital letters, a chronological record of the history of Greece and Athens for a period of over thirteen hundred years, beginning with the reign of Cecrops 1582 B. C. The chronicle of the last ninety years has been

lost and the entire inscription is seriously defaced.

Aryan Race, a name applied to what has been termed the Indo-European or Indo-Germanic family. According to a theory now pretty well exploded, the Aryans were originally located somewhere in Central Asia, possibly east of the Caspian, whence they swarmed eastward to Afghanistan and northern India, and westward throughout Europe. Owing to the widespread use of many common words, such as father and mother, it was conjectured that the Celts, Teutons, Greeks, Latins, Slavs, Persians, and Hindus were but swarms or branches of the same race—a great Aryan family. It is now believed that the Hindu, the Irishman, and the Norwegian indeed derived similar words from some one source, or by early intercourse; but it is held that differences in the shape of the head and many other physical characteristics justify the assumption that these people belong to different races. Race is a matter, not of language, but of physical structure. In other words, the old so-called Indo-European or Aryan family has been broken up into fragments of uncertain size, relationship, and origin. It is still allowable to speak of Aryan languages, but not of an Aryan race.

Asafetida, as′a-fĕt′i-dȧ, a drug obtained from a plant of the parsley family, native to Persia and Afghanistan. In early spring the leaves are torn off and the soil is removed from the parsnip-like root, until it is exposed for an inch or two. A few weeks later a horizontal slice is cut from the top of the root. A milky juice then oozes up and dries into the gum-resin like lumps in which asafetida is brought to market. The drug has so disagreeable an odor that the Germans call it "devil's drug." It is not a welcome article of freight among western nations, but in India, Persia, and even in France it is used like garlic to flavor food. In Anglo-Saxon countries, asafetida is considered a valuable remedy in cases of hysteria, infant convulsions, etc. See DRUGS; MEDICINE.

Asbestos, a fibrous variety of the mineral amphibole or hornblende, composed of separable filaments, with a silky luster; also the name popularly applied to a similar variety of the mineral serpentine, called chrysotile. It is mined in Canada, Vermont, Georgia, Wyoming, Virginia, South Carolina, and in Staten Island, New York. Some varieties are compact and take a fine polish; others are loose, like flax or silky wool. Its fibers are sometimes delicate, flexible, and elastic, sometimes stiff and brittle, and when reduced to a powder are soft to the touch. Its colors are various shades of white, gray, or green, passing into brown, red, or black. The name is derived from a Greek word meaning "incombustible" and the great value of asbestos lies in its resistance to heat and fire, for which reason it has been applied to many commercial uses.

The ancient Romans first learned its value and obtained their supply from the Italian Alps and the Ural mountains. The Alpine variety was known as amianthus, and when it was found that cloth made from this material was indestructible by fire, it was used for wrapping dead bodies before they were placed on the funeral pyre, in order to preserve the ashes for preservation in urns. This kind of cloth then became the funeral dress of kings, as it was both rare and costly. In the thirteenth century the traveler Marco Polo found in Siberia a similar cloth that fire would not destroy, but it was not until 1720 that the manufacture of asbestos began in Europe, after fresh discoveries of deposits of the mineral in the Ural mountains.

About 1860 it began to be of commercial importance, and some years later asbestos mining began in the province of Quebec, Canada, which produced finer grades of the fire-resisting material than had been known up to that time. Soon Canada was producing about 85 per cent of the world's output, Russia 10 per cent, the United States 3 per cent, and Africa and other countries 2 per cent. The Quebec deposits are found in two districts, one known as the Thetford and Black Lake district and the other as the Danville district. Deposits are known as cross fiber, slip fiber, or mass fiber, according as the fiber crosses the vein or is parallel to it.

The veins of the mineral vary from a mere thread in width up to four or six inches, and are very irregular. The length of the fiber cannot be told from the width of the vein. In Quebec the mines have been carried to a depth of several hundred feet, the quality of the asbestos being the same at all depths. It is valued for trade purposes according to the length and fineness of the fiber, its resistance to heat, strength under pull, and flexibility. Some varieties will withstand a temperature of 5,000 degrees Fahrenheit, while most will resist from 2,000 to 3,000 degrees of heat.

Asbestos is truly one of nature's most wonderful products. When mined, it is in rock formation, heavy and dense; but the rock is composed of silky fibers which can be separated into convenient lengths, carded, spun, and woven, like flax, wool, or silk. Each fiber is light and feathery, yet in the mass this wonderful material has outlasted the hardest kinds of rock in the earth's crust, for while these latter are worn away by time, asbestos imbedded in them remains as the ancients found it, "indestructible." It resists the action of nearly all commercial acids as well as decay, heat, and fire. It is generally described by chemists as a silicate of magnesia, with slight traces of other minerals.

In order to produce 100 tons of asbestos fiber in the Quebec mines, it is necessary to quarry, blast, hoist, and crush in the mills about 2,000 tons of the rock in which it is found. Asbestos mines are operated like large stone quarries, the miners working down by a series of steps or benches, which enable them to blast out a large quantity of rock at a time. Visible veins of asbestos are then removed from the blasted rock by men called "cobbers" with small hammers, and this is graded according to quality on the spot; but the bulk of the rock is loaded into cars by steam shovels, or hoisted to the surface in buckets, and conveyed to the crushing mills. The crushed rock is then passed over shaking-screens and as the fiber is much lighter than the rock, the asbestos comes to the top when the screens are shaken and is sucked by a current of air into revolving cylinders, called graders.

These graders complete the mining process by separating the fiber into three different grades for the market. The best grade is called long spinning fiber and is used in the manufacture of various fireproof textiles. The second is a medium grade, used for making roofing material, heat insulation, etc.; and the third, called short grade asbestos, is used in the manufacture of millboard, cement, etc. The fiber is packed and shipped in bags containing 100 pounds each. The value of the product ranges from $10 to $300 a ton.

The commercial use of asbestos has increased rapidly in recent years. It is woven into cloth of various weights, thicknesses, and density, for use as fireproof theater curtains, lining theater walls and scenery, and firemen's clothing. When intended for a theater curtain, it is often combined with strands of fine brass wire, the asbestos yarn being twisted around the wire before weaving into cloth. Ropes used by firemen are also often made of asbestos, being either entirely composed of asbestos fiber or of asbestos with a steel wire core. Such a rope of ¾-inch diameter with wire core has been found capable of sustaining a weight of nearly 2,000 pounds, and without the core asbestos rope is sufficiently strong for the ordinary uses of a fire department. Other uses to which asbestos is applied include the manufacture of roof shingles, or asbestos slate; stucco plaster, fireproof lumber, or asbestos wood; mill board, asbestos paper, insulating material, and packings; coverings for pipes, furnaces, and parts of locomotives, to prevent radiation of heat; brake linings for automobiles, motor trucks, hoists and cranes, and as a filler for high-grade paints. One of the most important of these varied uses is that of asbestos packings and gaskets for the steam locomotive, which have made possible the use of high-pressure and superheated steam. Asbestos is also one of the best filtering materials known, and as a non-conductor of heat is made up into clothing for the protection of workmen from the dangers of electrical and blast furnaces, glass plants, etc. It is also used for many domestic purposes where protection from

intense heat is required. Asbestos mats are a good illustration.

Asbjörnsen, Peter Christen (1812-85), a distinguished student of folklore and zoölogy, was born at Christiania. He rereived his education at Christiania, after which he was a teacher for several years. He devoted himself to zoological and botanical studies, and made long journeys on foot for scientific purposes. While on these journeys he collected folk tales and legends, and in the writing of these and their publication, he was aided by his life long friend, Jörgen Moe. Among these are *Norske Folkeeventyr (Norwegian Folk Tales);* and *Norske Huldre-eventyr og Folkesagn (Norwegian Fairy Tales and Folk Legends).*

On account of his scientific researches the government allowed him traveling stipends from 1846 to 1853. He later studied forestry and held several positions in connection with the forest and turf industries, until 1876, when he was pensioned. He made important discoveries in deep sea-soundings, and wrote much on scientific subjects, but his fame rests on his fairy tales, which are original and show an unusual literary talent.

Asbury, Francis (1745-1816) the first Methodist Bishop to be ordained in the United States. He was born in the vicinity of Birmingham, England, and came to Philadelphia in 1771 to do missionary work. During the Revolutionary War Asbury was under suspicion, but after two years' surveillance the government decided that his scruples were religious, rather than political, and he was set free. When he came to America there were but 316 Methodists in the Conference, but after his release from government surveillance he worked so diligently that soon there were 83 Methodist ministers and a membership of nearly 14,000. With Thomas Coke, Asbury was made a "joint superintendent," which title was later changed to "bishop." His only writings were his journals.

Ascanius, as-kā′ni-ūs, or **Iulus,** ī-u′lŭs, in classical legend, the son of Aeneas and Creusa. As a child he accompanied his father in his wanderings after the Trojan War. Later he supported Aeneas in his wars with the Latins, succeeded him in the government of Latium, and founded the city of Alba Longa. His descendants ruled Alba for 420 years. They are called the Julii. See AENEAS; TROY.

Ascension, a small island in the southern Atlantic 1,000 miles off the Guinea coast. The area is 35 square miles. Population, 120. The island is of volcanic origin. It rises to a height of about 3,000 feet. Fifteen acres are under cultivation. A small British garrison is maintained. There is a regular postal service. Telegraphic communication is carried on with St. Helena 700 miles to the southeast, with England, and with the Cape of Good Hope. The island is the resort of the sea turtle, which come in thousands to lay their eggs in the sand. In 1907, 106 were taken, from 392 to 777 pounds in weight; they are stored in ponds, and eventually killed and distributed among the people. Rabbits, wild goats, partridges, pheasants, and guinea-fowl are more or less numerous on the island, which is, besides, the breeding ground of myriads of the sooty terns or "wideawake." These birds come in vast numbers to lay their eggs about every eighth month.

Asceticism. See ANCHORITES.

Ascham, ăs′kam, **Roger** (1515-1568), a Yorkshire scholar. He was a graduate of Cambridge. He was renowned as a student of Greek and Latin. In 1548 he became tutor to the Princess, afterward Queen, Elizabeth, with whom he read Cicero, Livy, Sophocles, and other classical writers. Ascham traveled extensively as secretary to the English ambassador to Charles V. He wrote a famous treatise on archery, called *Toxophilus.* His best known work, however, is *The Scolemaster,* expressive of his methods of teaching Latin, and giving in a general way his conception of the proper method of education. *The Scolemaster* will well repay careful reading. Although he lived in an age when Latin was the language of the educated, and was himself the leading Latin scholar of his day, Ascham took pride in saying of the *Toxophilus,* that he had "written this Englishe matter in the Englishe for Englishemen." See ELIZABETH.

Ash, an exceedingly useful and handsome tree of the north temperate zone. There are about fifty species. The ashes are fine shade and ornamental trees. The English ash and the white ash of America yield valuable timber, much used for tool handles, wagon tongues, inside finish of houses, furniture, splint baskets, cars, and all other purposes for which a light, straight-grained, moderately tough wood is desired. We have a white ash, a black ash, a red ash, a blue ash, a water ash, a green ash, and several others which it is sometimes almost impossible to tell apart. In the south of Europe, especially in Italy, grows the manna, or flowering ash. From it a white substance called manna is obtained by cutting the bark. Sometimes this substance drops from the leaves without any artificial stimulus. In warm countries the common ash also is said to produce a whitish substance like manna. Cultivated varieties of ash are: the weeping ash, the branches of which bend almost to the ground; the curled-leaved ash, and the entire-leaved ash, with many of the leaves simple, instead of compound as is usual. The flowers of the ash appear in early spring before the leaves. The seed of the ash is furnished with a wing that causes it to whirl to a distance in falling. The so-called "mountain ash" with red berries is not an ash at all, but belongs to the pear tribe.

Ashanti, a British possession in West Africa, was placed under the protection of the Crown in 1896, and was formally annexed in 1901. The territory has an area of approximately 20,000 square miles, and is separated from the Gulf of Guinea by the British Gold Coast. Ashanti had a population in 1921 of 420,000. Coomassie, the chief town, has 20,000 inhabitants. The governor of the Gold Coast is also the governor of Ashanti, but the Gold Coast laws and ordinances do not apply to the annexed territory.

The natives are docile, industrious negroes, engaged in the cultivation of cocoa and rubber plantations, and in gold mining. The Ashanti forests are rich in mahogany, cedar, oil and rubber bearing trees, and trees bearing fruits and gum copal. These forests, if properly preserved, will be a valuable source of revenue for years to come. Game is plentiful in the eastern part of the country. Rainfall and small streams insure an abundant water supply, and corn, yams, ground-nuts and bananas are grown in large quantities. The gold output in 1920 was 70,719 ounces.

The government maintains numerous schools in Ashanti, and there are also a number of mission schools. A police force of 155 men is all that is needed to keep order in the country.

Ashburton, Alexander Baring, Lord, (1774-1848), an English diplomat, known in the United States through his having framed with Daniel Webster the Ashburton Treaty, by which the boundary dispute known as the Aroostook War, was settled without bloodshed. See AROOSTOOK WAR.

Ashburton Treaty. See WEBSTER ASHBURTON TREATY.

Ashes, the earthy, mineral substances left after burning. They are the part of an animal or plant that cannot be burnt. Ashes consist largely of lime, sand, soda, and potash, and may contain sulphur, phosphorus, zinc, copper, iron, and other elements. Different parts of a plant or animal yield ashes of different composition. It is quite possible for a chemist to determine the source of many ashes. He would have no difficulty, for instance, in distinguishing between the ashes of a cigar and those of a corncob; or between the ash of maple sugar and that of raw cane sugar. How plants, growing side by side in the same soil, can store up different solid materials in their tissue is an interesting problem. Certain seaweeds, growing wholly afloat in salt water, notably on the coast of Ireland, yield ashes rich in iodine, yet no trace of iodine can be found in the sea water. It would seem that each species has the ability to select the earthy food of its own desire. A plant accepts a substitute so far as it can, taking more magnesia, for instance, in case lime is scarce; but in general the farmer and gardener may accept the double lesson taught by ashes,—first, that the soil must supply what the plant needs or it will not grow, and secondly,

that soil will best raise the kind of plants for which it has the requisite sort of food.

Lye obtained by leaching or allowing water to trickle through an ash barrel or a hopper of ashes has long been used for soap making. Hardwood ashes, especially those of hickory and maple, are the best for this purpose. Wood ashes are also an excellent fertilizer for fields. They should be well scattered, however. The ashes of coniferous trees, as pine and fir, have little value for either purpose.

Asheville, N. C., a celebrated health resort, is stuated in the Blue Ridge Mountains, near the confluence of the French Broad and Swannanoa rivers, 210 miles west of Raleigh, and on the Southern Railroad, which has four lines radiating from the city. The elevation is 2,350 feet, and many of the mountains nearby rise to 6,000 feet. The mean annual temperature is 55° F.

Asheville is a favorite health resort, being visited, summer and winter, by more than 200,000 health seekers annually.

There are a number of beautiful parks in the city and surrounding country, which may be reached by automobile over excellent roads. Biltmore, the famous country home of George W. Vanderbilt, is two miles southeast of the city. It is considered the most beautiful and magnificent private estate in America. Its area was originally 132,000 acres, and included Pisgah Forest and botanical gardens, with many rare specimens. Pisgah Forest was purchased by the National Forest Reservation Commission in 1914.

The more conspicuous buildings include the Park Memorial Library, the Federal building, the auditorium, and a number of hotels and sanatoriums. In addition to the public schools, there are a Normal and Collegiate Institute, the Home Industrial School, Saint Genevieve's College, Asheville School for Boys, and Asheville School for Girls. Population, 28,504.

Ashland, Ky., a manufacturing city on the Ohio river in Boyd County, 155 miles from Cincinnati, on the Chesapeake & Ohio and the Norfolk & Western railroads. Its location is in a rich oil and lumber region, and it is a manufacturing center. Ashland was settled in 1854 and incorporated in 1870. Population, 14,729. The Tri-State Chautauqua is held at Clydesdale, in a private park of 75 acres.

Ashland, Wis., the county seat of Ashland County, is situated on Chequamegah Bay, an arm of Lake Superior. It is important as the northern terminus of the Chicago and Northwestern railroad, and the eastern terminus of the Northern Pacific. The twenty mile long harbor is the most sheltered on Lake Superior. Ashland is the shipping point of the Gogebic Iron Range. It has a modern school system, including a model high school costing originally $150,000. Population, in 1920, 11,334.

Ashtabula, Ohio, is situated at the mouth of the Ashtabula River, 55 miles east of Cleveland. Through its railroad and lake commerce, aided by extensive harbor and river improvement, it has developed into an important transfer shipping point, particularly for coal and iron. It has a large dry dock and a shipbuilding plant, as well as many factories, the chief products of which are farm implements, woolen goods and leather goods. The population was, in 1920, 22,082.

Ashtoreth. See BAAL.

Ash Wednesday, the first day of Lent. It is so called from a custom in the Roman church of sprinkling ashes on the heads of penitents on that day. This ceremony is said to have been instituted by Gregory the Great. The rite, as performed at the present day, is somewhat different. The ashes are now consecrated on the altar, sprinkled with holy water, signed with the cross, and scattered over the heads of the worshipers, while the priest repeats, in Latin, the words: "Remember that thou art dust, and wilt to dust return."

Asia, the great mass of land that constitutes the northeastern part of the Old World. The meaning of Asia is unknown. Belonging originally to a small city in Asia Minor, the term was extended by the Greeks to the region immediately adjacent, and was used finally by writers for the entire grand division now known by the name. Asia is the largest of the six continental divisions. The distance from

the most southwesterly part of Arabia to the extreme northeastern point of Siberia is nearly 7,000 miles. The total area is estimated at 17,300,000 square miles, about one-third of the earth's entire land surface, and about one-twelfth of the entire surface of the globe. It is bounded by three oceans. The Arctic coast is the most regular. The eastern coast is indented by five border seas, inclosed by curved chains of continental islands. The southern coast is prolonged into the three extensive peninsulas of Farther India, Hindustan, and Arabia. The entire coast line is about 35,000 miles in length.

Topography. The mountain systems of Asia are the most complex of any of the grand divisions. Its plateaus are the most elevated in the world. The Pamir is called, not improperly, the "roof of the world." So far as altitude is concerned, the Alps might be buried a mile beneath the mountain mass of Tibet. The Himalayas are the loftiest chain of mountains in the world. Mount Everest, the culminating peak, 29,002 feet, is the loftiest peak known. It is nearly twice as high as Mt. Blanc, and is a half higher than Mount McKinley, the highest peak of North America. Two of its neighbors are over 28,000 feet in altitude. Travelers desiring to penetrate this region must cross the ranges by means of passes from 15,000 to 22,000 feet in height, a tremendous climb for yaks, horses, camels, or men.

Rivers. Asia has nine great rivers, any one of which is larger than the Rhine and the Danube combined. The Obi, the Yenisei, and the Lena carry the icy waters of Siberia to the Arctic Ocean. The Amur, the Hoang-Ho, and the Yang-tse pour a yellow flood into the Pacific. The Brahmaputra, the sacred Ganges, and the Indus flow south to the Indian Ocean. Asia possesses not only the highest table-lands and mountains, but shares with southeastern Europe the greatest area of interior drainage and of land depression known. The basin occupied by the Sea of Aral and the Caspian is not less than 2,000,000 square miles in extent. The surface of the Caspian lies eighty-three feet below that of the sea.

Soil and Climate. As might be expected, Asia possesses a great diversity of soil and climate. It has vast river plains of unsurpassed fertility, and extensive, rainless regions of drifting sands as barren as the Sahara. It lies in three zones, the tropical, the north temperate, and the arctic. The flora and fauna of the jungles in the south are rivaled only in the valley of the Amazon and in equatorial Africa. The mountains of Central Asia rise into a region of cold, lifeless, eternal, glittering stillness. The shores of the Arctic Ocean are, for the most part, vast, tenantless, frozen tundras, with at best a little moss or flowers and shrubs growing in earth that thaws out for a few inches during the brief summer. Between these extremes may be found every variety of soil and climate known on the globe.

Population. Three of the chief divisions of mankind are represented in Asia. The Ethiopic or black division is found in a part of Malaysia. Southwestern Asia, including Arabia, and the Caspian Region, Persia and Afghanistan, with a large part of India, and a share of Siberia and Manchuria as well, are inhabited by white people. The eastern coast is for the most part occupied by inhabitants of the yellow race. Ignoring the black element, the entire population of Asia is estimated at 280,000,000 whites and 540,000,000 of the yellow race, or 820,000,000—more than one-half the population of the world.

Political Divisions. The following Asiatic countries have independent governments:

Chinese Republic. This includes China proper, Mongolia, East or Chinese Turkestan and Tibet with a claim on Manchuria.

Japan, the island empire, which in addition to the large Japanese islands includes Formosa, Korea, and the southern half of Sakhalin.

Persia, which is under some obligation to Great Britain because of a loan provided for in 1920. Expert financial advice is provided by other powers, usually Great Britain or the United States, but in the regulations of its own affairs Persia has complete autonomy.

STONE CUTTERS IN JERUSALEM.

NATIVES BATHING IN THE GANGES

Afghanistan, made ndependent by a treaty with Great Brit n, ratified in 1921. This treaty for the fiist time provided for an interchange of diplomatic representatives between the two countries.

Hedjaz, a region occupying a large portion of Arabia and one of the latest independent governments of the continent. It became independent by a treaty with Turkey in 1916.

Siam, the peninsula kingdom consisting of seventeen provinces.

Turkey. In the Great War Turkey lost nearly all of its territory but since then has regained most of Asia Minor.

Arabia. See *Hedjaz* above.

Syria is under a French mandatory.

Palestine is under a British mandatory.

Mesopotamia has a quasi-independent relation with Great Britain.

The following countries are either colonies or are governed as mandatories:

GREAT BRITAIN. The British possessions include India, Aden Colony and Protectorate, Bahrein Islands in the Persian Gulf, the Straits Settlements, the Federated Malay States protectorate, Hong Kong, and adjoining territories, Weihaiwei in the Chinese province of Shantung, and Beluchistan. Palestine is administered as a British mandatory.

FRANCE. The French possessions include French Indo-China, Cochin China, Annam, Cambodia, Tonking, Laos, Kwang Chau Wan and Syria which is administered as a mandatory.

JAPAN. The Japanene administer Kiaochau as a mandatory and are tentatively occupying the southern portion of Sakhalin.

RUSSIA. The Soviet Republic controls Siberia which includes the northern portion of the continent and also the quasi-republics of Azerbaijan, Georgia and Armenia in the southeastern part of the continent. The Russian possessions are under the soviet form of government.

Siberia, a region much larger than Europe, occupies the northern and central part of the continent. It formed a great part of the late Russian Empire.

For a further account of Asia the reader is referred to the various articles on Asiatic countries, cities, rivers, islands, etc.

Asia Minor, a name given by the ancients to that portion of Asia that lies between the Black Sea and the eastern basin of the Mediterranean. The term means "Smaller Asia." It is geographical, rather than political. Asia Minor has never been an independent country or had a history of its own. Before the beginning of historical times, the Aegean coast was occupied by Greek colonies. The nearest approach to a local government was that of Lydia, under Croesus, 560-546 B. C. The cities and provinces of Asia Minor were conquered by Cyrus for the Persians and by Alexander the Great for the Greeks. The region has passed practically without resistance under the government of the Romans, of the Byzantine empire, and the Arabs.

In April, 1920, there was a convocation of a Grand National Assembly at Angora, under the leadership of Mustafa Kemal Pasha, and his associates. This Assembly declared itself vested with complete power, without throwing off allegiance to the Sultan. It vested its executive power in a body of Commissioners, forming what is practically a Cabinet. The Angora government claims to be the sole lawful government of Turkey, and exercises *de facto* all the functions of the government in the whole of Asia Minor not under foreign occupation. The Mohammedans are predominant with a population before the Great War of 7,000,000. The total population of Asia Minor (Old Turkey) was 10,186,900, with an area of 199,272 square miles.

Aske, as'ke, in Norse mythology, the first man to whom Odin gave life and soul. Embla was the first woman. Midgard was their home, and from them sprang the whole human race.

Asoka, a Buddhist emperor of India, who reigned from 264 to 228 or 227 B. C. His full name was Asoka Vardhana, and his relation to Buddhism is much the same as that of Constantine to Christianity. Though ignored in the books of the Greeks and the Brahmins, Asoka figures largely in the legends and chronicles of the Buddhists. He caused inscriptions to be made on pillars and rocks; thirty-five of these

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1. Dance staff of the Batta tribe of Sumatra.
2. Ancestor image from Nias.
3. Weaver's staff, Ainos tribe.
4. Native ornament.
5. Bronze image of Buddha.
6. Helmet of mail.
7. Indian gauntlet of mail.
8. Japanese kettle, cover of embossed silver
9. Singhalese mask.

HANDIWORK OF ASIATIC NATIVES.

inscriptions, one of them found in 1896 on the spot where Buddha was supposed to have been born, are still in existence. The inscriptions are solely of a religious nature; for Asoka, after his conversion to Buddhism, became a zealot, showing constant concern for the welfare of man and animal, and finally making Buddhism the state religion of his realm. Asoka was the most powerful and imposing of the native rulers of India, holding dominion over an empire that was as large as was India before the conquest of Burma. He was stern and cruel at the beginning of his reign; but after his conversion a change took place. He became gentle and considerate, watching over the material and spiritual welfare of his subjects, and sending missionaries to the far ends of his realm to propagate the kindly Buddhist religion. His memory is still revered in the land he once ruled.

Asp, or **Haje,** a venomous serpent of Egypt akin to the cobra of India. It is three to five feet long. Like the cobra, it dilates the loose folds of the neck into a hood. The jugglers of Cairo extract its fangs and teach it to dance for the amusement of the people. Both the asp and the cobra are fond of music. It is said that these jugglers of today can throw the asp into a rod-like rigor by pressing the nape of its neck. See COBRA; CLEOPATRA.

Asparagus, a genus of useful and ornamental plants belonging to the lily family. There are about 150 species, native to warm or tropical regions. Southern Africa is noted for many beautiful species. Asparagus stems are finely dissected. What appear to be leaves are really thread-like branches. The branchlets of several ornamental species form feathery plumes. The real leaves are reduced for the most part to pointed scales. Some species are climbers; some are trailing plants; some are bushy.

The common garden asparagus is a perennial herb native to Europe and Asia. The Greeks and Romans were familiar with asparagus. It has been cultivated for at least 2,000 years. It is a relative of the lily and the onion, but does not look like them. The fleshy young shoots are cut for table use as they peep from the ground. The fruit is a red berry. The seeds are black. The roots and berries were formerly in demand as remedies. Asparagus is cultivated widely. It seems to do fairly well in the soil of almost any garden. Like the horseradish, once planted, it persists in fence corners and other sheltered spots. Asparagus does best, however, in rich, deep, mellow soil. Gardeners sow the seed usually in drills and transplant when the plants are about a year old. The shoots should be cut off daily, as soon as the tips make their appearance over ground. If allowed to grow for a few days, they darken in color, and become woody. The asparagus season lasts "until peas come." After that the shoots are allowed to grow. If the pruning should continue throughout the entire growing season, the plant would lose vitality. Bailey states that 12,000,000 bunches of asparagus are sold annually by the market gardeners of the United States. The eastern centers of production are near the Atlantic cities, as Boston, New York, and Philadelphia.

The largest asparagus plantation in the United States, probably the largest in the world, is owned by the Voorman Company of California. It is situated on Baldwin Island in the San Joaquin River. The island, which comprises in all about 7,000 acres, has been diked. Three thousand acres are under asparagus. The island has been fertilized by the tides for ages. The soil is deep and enormously fertile. During the asparagus season, which lasts from March 15th to June 15th, 1,500 persons are employed. The harvesters go up and down the rows daily, cutting the tender shoots, just as they peep above the soil. It is interesting to know that about 50,000 acres of this marshy land has been reclaimed by diking and pumping. The region is called locally the Holland of America. It is destined, no doubt, to retain its claim as the asparagus center of the world.

The sprouts of the bitter asparagus are very similar in appearance to the common asparagus, but owing to bitterness are not

edible. Many species of asparagus are grown for ornamental purposes in greenhouses, their feathery greenness being used to supplement flowers in bouquets.

Asparagus is greatly esteemed for the table, the first young shoots being much prized for their tenderness. While asparagus is low in food value, it is invaluable as an addition to other foods, and is very wholesome. It may be prepared in several ways, but it is usually cooked, which should not be too long, since that spoils its flavor. It is usually served hot with a butter-sauce, and is sometimes eaten cold as a salad. Whether asparagus is green or blanched, is a matter of personal taste, and not of quality, though for ordinary purposes the green asparagus is most used. Asparagus is supposed to have medicinal qualities, and is used by pharmacists for several ailments, particularly in kidney diseases. It is usually made up in the form of pills.

Asparagus, Diseases of. Asparagus is subject to several diseases, the principal one being a rust caused by a fungus growth. This disease has been prevalent in Europe, but did not appear in any marked degree in the United States until 1897, when it became threatening. The leaves and stems become covered with red blotches. Some varieties are less susceptible to the disease than others. In California, where the asparagus plants are attacked from time to time, a thorough sprinkling with sulphur has proven a successful remedy.

While asparagus under cultivation is rarely attacked by insects, it is sometimes preyed upon by two small beetles, one of the varieties being introduced from Europe in 1856. As larvae, these beetles destroy shoots, berries and seeds, and when adult, they attack the growing shoots.

Aspasia, as-pā′shĭ-ä, a celebrated woman of Greece. The dates of her life are not known well, but she flourished during the so-called Age of Pericles. She was a native of Miletus. She appears to have been a woman of talent, education, and beauty. She removed to Athens in her youth. Here she attracted the attention of Pericles. As she was not a citizen of Athens, Pericles could not, under the laws of the city, make her his wife, but he lived with her as such, and made her the mistress of an elegant home. Like Madame de Staël, Aspasia made her home the resort of intellectual people. Anaxagoras, the philosophical friend of Pericles, was a frequent visitor here. Socrates delighted in her wit. Phidias, the wonderful artist, liked to come in and talk about his work. Walter Savage Landor, who never allows a date to interfere with his saying a good thing, intimates that Thucydides read his history to Aspasia for criticism, and that the great playwriters, Sophocles and Aristophanes, were eager for her commendation. However this may be, the home of Pericles and Aspasia may be termed with justice the "intellectual center of Athens." Aspasia is one of the few women of Greece that require mention. In order to understand the intellectual position of Aspasia, it is necessary to hold in mind that the women of Greece were educated for health and household duties only. It will hardly do to say of women who were wont to listen to the masterpieces of the world's greatest tragedians, that they were illiterate; and yet the fact is that the wives of even the most eminent men in Greece were not taught to read and write. By way of exception, Aspasia seems to have been a truly remarkable woman.

Aspen. See POPLAR.

Asphalt, ăs′fălt, a dark, pitchy, material which, according to one theory, is the result of decomposition of vegetable or animal matter. It appears to be oxidized petroleum. Artificial asphalt, in small quantities, is evolved as a by-product from coal in the making of illuminating gas. Asphalt solidifies when cold, and whether liquid or solid, is insoluble in water. It varies in color from black to a dark brown, but always has a strong, pitchy odor. Asphalt is found in small quantities in Switzerland, in eastern Scotland, in Alsace, in Mesopotamia. Asphalt springs occur abundantly on the shores of the Dead Sea, where it is known to the Arabs as Moses' stone. The greater part of the western world's supply of asphalt, however, is obtained from the island of Trini-

dad, where a large pitch lake occurs. This lake is about half a mile in diameter and is supposed to be eighty feet deep. Around the shores, the surface is covered with hardened asphalt, but the center is hot and steaming. When the wind blows away from shore, the crusty asphalt is broken into pieces and is sent down to ships in the harbor by means of buckets running on an overhead cable.

An American company has obtained possession of an asphalt lake at Bermudez, Venezuela. This lake is two miles wide. The crusty asphalt is quarried like ice. Liquid asphalt rises as fast as the blocks are removed.

The most important use of asphalt at the present time is for street paving, and cities like Detroit, Mich., and Washington, D. C., are particularly noted for their asphalt roads. The use of asphalt for this purpose dates back to 1838, when sidewalks were laid in Paris with a variety of asphaltic limestone obtained from Switzerland and the lower Rhone valley. This was a natural mixture of bitumen with a large quantity of mineral matter, of which large deposits have been found in France, Switzerland, Sicily, and Germany; and most of the asphalt paving in Europe has been done with this material. It contains from 5 to 15 per cent of bitumen, or sufficient to cause the rock, when powdered and heated, to soften somewhat, so that it can be used, in the form of heated powder, for laying pavements, which speedily harden. In the United States a similar deposit of asphaltic limestone is found in Uvalde county, Texas. This is of fossil character, contains from 15 to 25 per cent of bitumen, and is used in commerce, when extracted, for a variety of purposes under the name of "lithocarbon," especially in the manufacture of insulating material.

The asphalt paving composition used generally in the United States contains about 15 per cent of a refined solid Trinidad asphalt mixture, including petroleum residue, to which is added from 60 to 70 per cent of clean sand and then 10 to 25 per cent of pulverized limestone. This makes the surface coating for the pavement, which is usually laid upon a concrete foundation, then smoothed and rolled by steam rollers. This form of paving is known as sheet asphalt, the composition being spread so as to make large continuous sheets. Another kind is asphalt block paving, in which asphalt blocks are first made by machinery, from crushed stone and refined solid asphalt. Still another form of asphalt paving, largely used for sidewalks, basements, outhouses, etc., is known as "mastic" and is made of asphaltic limestone, with which about 8 per cent by weight of refined Trinidad asphalt is mixed, heated, and cast into blocks. Before laying the sidewalk or floor these blocks are broken up and again heated with the addition of a mixture of refined asphalt and petroleum residue, then mixed with sand and fine gravel and poured hot upon the prepared foundation, spread evenly and smoothed with wooden implements.

It will be noted that petroleum residue is mixed with Trinidad asphalt for paving purposes. This residue is known and sold as artificial asphalt, to distinguish it from nature's product. It is a by-product of the great oil refineries. After the lighter products of the petroleum, such as gasoline, etc., have been separated and removed, the black, pitchlike remainder goes into use as artificial asphalt. This substance lacks the durability of the natural product, but is combined with the latter for paving purposes to lessen the cost of asphalt roads. In such a combination the natural asphalt acts as a binder and prevents the pavement from becoming brittle, breaking, and crumbling, as would be the case if the artificial asphalt alone were incorporated with sand and stone.

In its crude state Trinidad asphalt, or "lake pitch," as it is sometimes called, contains about 40 per cent of bitumen, 34 per cent of earthy matter, 9.3 per cent of organic matter, and 16.5 per cent of water. After refining the water is eliminated and the proportion of bitumen is raised to about 60 per cent. Some of the refining is done on the island of Trinidad, but most of the asphalt intended for the United States is refined in great works at Maurer, N. J. The crude asphalt is placed

in large rectangular tanks, each of one hundred tons capacity. Here it is subjected to steam heat conveyed to the tanks at a pressure of 125 pounds and about 325 degrees Fahrenheit. This process removes the water and melts the asphalt, which is also well stirred up by live steam passing through it in the tank, so that most of the impurities and all foreign substances are removed. The melted asphalt is then drawn off from the tanks into barrels, where it again solidifies, and this is the refined asphalt used in paving. Solid bitumens similar to asphalt include gilsonite and grahamite, gilsonite being found in large quantities in Utah and used for coating roofing material and making varnishes, while grahamite is used for making varnishes and insulators.

See TRINIDAD.

Asphodel, ăs′fō-dĕl, a plant of the lily kind. It is known also as king's-spear. There is some confusion in the use of the name. The common asphodel of the ancients, the asphodel of Greek mythology, is a handsome plant growing from a cluster of fleshy roots to a height of from two to four feet. The leaves are long, rough edged, and pointed. They cling closely to the stalk. The blossom is of a pallid yellow color. Among the Greeks the asphodel was the peculiar flower of the dead. Homer speaks of the shades of heroes congregated in the asphodel meadows of Hades.

The banks of asphodel that border the river of life.—Holmes, *Autocrat.*

Two angels, one of Life and one of Death,
Passed o'er our village as the morning broke;
But one was crowned with amaranth, as with flame,
And one with asphodels, like flakes of light.
—Longfellow, *The Two Angels.*

Asquith, Herbert Henry (1852-), an English statesman who was Prime Minister during an extremely critical period in British history. He was born at Morley, Yorkshire, England. He was graduated from Oxford in 1874, and was admitted to the bar two years later. In 1892, he became Secretary for Home Affairs in Gladstone's last ministry, and from 1895 to 1905 was the spokesman of the Roseberry Liberal Imperialists, supporters of the government during the South African War. He opposed Mr. Chamberlain on the question of tariff reform, and became Chancellor of the Exchequer after the Liberal victory of 1905. While in this position, he introduced the Old Age Pension Bill, which later passed into law. In 1905, Mr. Asquith succeeded Campbell-Bannerman as Prime Minister. After the outbreak of the Great War, Mr. Asquith's cabinet passed through several crises. In 1915, he was forced to form a national coalition ministry, but in 1916 the coalition fell. Asquith was a Member of Parliament in 1917, 1918, and 1920. In 1918 he published his *Occasional Addresses.*

Ass, a useful, homely member of the horse family, most closely akin to the zebra. It has long ears, a short mane, a shaggy coat, and a long-haired tail. The domestic donkey is supposed to be a native of Africa, possibly of Abyssinia. It was domesticated first in Egypt where it is still the burden carrier of Cairo and Alexandria. The donkey is slow, patient, homely, and is the type of obstinacy and stupidity; but its ability to live on coarse fare and its surefootedness among the mountains render it a valuable domestic and pack animal. Its use is general in the Levant.

See MULE.

Assassins, originally an order of religious fanatics, founded in Persia, about the year 1090. According to the tenets of their belief, their chief was inhabited by the Holy Ghost, and received his orders direct from the deity. Each member held himself bound to carry out the orders of his chief, and to put to death anyone obnoxious to the order. The name means *hashish-eater,* and is derived from a habit of exciting the members to murder by means of the drug hashish. The chief seat of the order was transferred to Mt. Lebanon, but their emissaries were sent everywhere, and spread terror throughout Christendom. They were exceedingly expert in the use of poisoned daggers, cords, and noiseless air guns. Their religion was a mixture of Judaism, Mohammedism,

Christianity, and the magic of the East. At their height, they were able, it is said, to oppose 50,000 troops to the Crusaders. A small remnant still remains, now characterized by piety, kindly manners, and poverty. The term has been extended to anyone who deliberately takes human life in a stealthy manner. Among the notable assassinations of public men, the following may be mentioned:

Philip of Macedon	B. C. 366
Julius Caesar	Mar. 15, B. C. 44
Thomas à Becket	Dec. 29, A. D. 1170
Lord Darnley	Feb. 10, 1567
William of Orange	July 10, 1584
Henry IV of France	May 14, 1610
Wallenstein	Feb. 25, 1634
Archbishop Sharp	May 3, 1679
Marat	July 13, 1793
Paul, Czar of Russia	Mar. 24, 1801
President Lincoln	April 15, 1865
Alexander II of Russia	Mar. 13, 1881
King Humbert of Italy	July 29, 1900
President McKinley	Sept. 6. D. Sept. 14, 1901
Arch Duke Francis Ferdinand of Austria	July 28, 1914
Field Marshal Sir Henry Wilson	June 22, 1922
Walter Rathenau	June 24, 1922
Michael Collins	Aug. 22, 1922

See NIHILISTS; THUGS.

Assaying, the process of determining the quantity of metal, as gold, silver, copper, iron, or lead, present in a given quantity of ore or alloy. In mining countries assaying is a very important business. One contemplating buying a mine secures samples of ore from different places in the vein, and takes them to an assayer to find out how much gold or silver or copper, as the case may be, the ore will yield to the ton. Miners desiring to sell ores submit them to the company's assayer to determine their value per ton.

Three methods of assaying are in common use, the wet, the dry, and the streak method. In the wet method, the precious metal is separated by means of acids; in the dry method, grinding and heating are relied upon. In both of these methods, the weight of the button of precious metal finally obtained is compared with the amount of ore assayed. The streak method is employed in testing the fineness of silver plate or of other articles which would be damaged by detaching a piece of the metal. It consists in rubbing the article on a rough surface, especially that of the touchstone, and producing a streak, from the appearance of which experts are able to determine the fineness of the alloy. In Great Britain articles of gold or silver are tested in this way and stamped with an official hall-mark by the Goldsmiths' Company, denoting the place, date, and fineness of the manufacture. In this way the British public may know what it is buying.

The assay offices of the United States are located at New York; Charlotte, N. C.; Deadwood, S. D.; Helena, Mont.; Boise, Idaho; Salt Lake City, Utah; Carson, Nev.; New Orleans, La.; Seattle, Wash.; and at the coinage mints of Philadelphia, San Francisco, and Denver. The New York Assay Office receives and refines more gold bullion than any of the mints, but the assay offices produce no coin. They report the assay of gold or silver ores in Troy ounces per ton of 2,000 pounds; and of gold or silver bullion in fineness or the number of parts of metal in 1,000 parts of bullion. The offices are public and assays of jewelry are made for a nominal charge. Jewelers report the fineness of their products in karats, or the number of parts of gold in 24. Thus gold jewelry marked 18-karat should contain 75 per cent of gold, or should be 750 fine. Gold and silver are purchased for the government at the assay offices, gold at the fixed price of $20.67 per ounce, and silver at the market price, which fluctuates. See GOLD; SILVER; MINT.

Assessor, in the United States, a local officer charged with the duty of preparing a schedule of property and owners. An assessor's schedule should show the name and residence of each property owner, and also the kind, quantity, and value of all property within the district, whether held by resident or absent owners. The work of the assessor is preparatory to determining the amount of tax to be paid by each property owner, and needs to be done with care and impartiality. The work of the local assessors is reviewed usually by a county board charged with the responsibility of seeing that the same kind of prop-

erty is given the same value in different localities. A state board of equalization, or a tax commission, reviews the work by counties to secure uniformity of values in all parts of the state.

Assignment. See BANKRUPTCY.

Assimilation, the selection of food material for the growth of organic tissues which takes place within the cells. It is the final step following digestion and absorption, by which the food becomes living substance. It is perhaps needless to say that the details and exact nature of the process are not understood.

Assin'iboin, the name of a tribe of Sioux Indians. There are now about 3,000 of them, nearly equally divided between northern Montana and adjacent parts of Canada.

The river bearing their name flows eastward through Manitoba into the Red River about forty miles above Lake Winnipeg. The Assiniboin is about equal to the Rhone in length and is navigable for flat bottomed steamers for a distance of 300 miles above its mouth. It is well known in the annals of the fur trade. Its extensive, fertile plains were once occupied by herds of buffalo, from which the Indians obtained their chief supply of food, tents, and clothing.

> Only, at times, a smoke-wreath
> With the drifting cloud-rack joins,—
> The smoke of the hunting-lodges
> Of the wild Assiniboins.
> —Whittier, *The Red River Voyageur.*

Associated Press, a coöperative organization of newspapers with the purpose of collecting the news. To save the individual paper the enormous expense of gathering the world's news single-handed, this association maintains an agent in practically every city. This agent telegraphs news to one of the central bureaus, which, in turn, transmits it to all the papers in the membership, or such portions of it as each desires. Any reputable newspaper may join the association by paying its weekly share of the expense, unless a competing paper published in the same town and already a member objects. As first formed in 1848 it was an arrangement among seven New York city papers. There are two large rival organizations in the United States. A corresponding means of gathering important news in Europe is called Reuter's Agency. The chief aim of the Associated Press is the promotion of efficiency and economy in gathering news. While its service is, on the whole, excellent, it burdens the wires with a vast mass of trivialities and wearisome repetitions and elaborations that are a source of annoyance to the genuine newspaper man. It has also been charged with coloring its reports at the suggestion of great interests involved. In the case of a measure before Congress, as, for instance, the ship subsidy, the charge is made that news on that subject is distorted to create sentiment in favor of, or to remove objections to the measure. In the case of a corporation charged with appropriating state timber, it is possible for a powerful political clique to induce reporters to withhold damaging facts and statements.

Assouan Dam. See NILE.

Assyria, an ancient empire of Asia. The region known historically as Assyria lies on the Tigris River, above Chaldea or Babylonia. Nineveh is the historical capital. The original Assyrians are believed to have been related to the present Finns and Turks, but they were overpowered and assimilated by the Semites. The later historical Assyrians were large, hook-nosed, black haired people of Jewish aspect and relationship. In the arts and sciences they were pupils of the Babylonians. Nineveh was an imitation of Babylon. About 1300 B. C. Assyria became a rival of Babylonia. In 745 B. C. the Assyrian Empire took form, and rapidly became the leading power of the world. Babylon was overthrown. Egypt was made a tributary province and the Ten Tribes of Israel were carried into captivity. New roads were built and old roads were diverted to center at Nineveh. Soldiers and military posts protected traffic in every direction. The caravan trade of the world was centered at the Assyrian capital. In 606 B. C. the Medes, a new power, arose. The Assyrian Empire and proud Nineveh disappeared. The leading Assyrian monarchs were Tiglath-Pileser,

Sargon, and Sennacherib. See NINEVEH; BABYLON; CUNEIFORM WRITING.

Assyrian Literature. See LITERATURE.

Aster (a star), an autumn flower of great beauty. Gray recognized fifty-four different asters east of the 100th meridian and north of the southern line of Virginia. Our Rocky Mountain region is full of them. Britton and Brown's *Flora* gives the number of species of asters as not less than 250, chiefly North American. England has but one aster, a salt marsh plant. China and Japan have many. One from far off Van Diemen's Land smells of musk. Most species are perennial herbs. A few are shrubby. American asters are of many colors and sizes. They belong to the composite family. What seems a flower is really a large number of flowers in a head. Close examination will show a large number of small flowers in the center, with an outer row of showy strap-shaped flowers, always of some other color. Our garden asters are from China. They are not true asters, but are near relatives. Asters are late flowers to bloom. They are exceedingly welcome in the sere days of autumn. Bryant in his *Death of the Flowers* speaks of them:

> But on the hills the golden-rod, and the aster in the wood,
> And the yellow sunflower by the brook in autumn beauty stood,
> Till fell the frost from the clear, cold heaven, as falls the plague on men,
> And the brightness of their smile was gone, from upland, glade, and glen.

Asteroids, small planets traveling between Mars and Jupiter. Kepler, and after him others, suggested that a planet might naturally be looked for in the wide gap between Mars and Jupiter. The discovery of Uranus in a similar gap led to the formation of an association of twenty-four astronomers who subdivided the zone in question and began a careful search for the expected planet. January 1, 1801, an Italian astronomer, Piazzi, discovered a very small planet which he called Ceres. A little over a year later Pallas was found in the same locality. Two years later Juno, and three years later again, Vesta were discovered. So many have been found since, that Grecian mythology has been pretty well ransacked for names, and a circle with an inclosed figure is now the astronomer's nomenclature. The number of asteroids has passed five hundred. In place, then, of the expected planet, a host of fragments have been found, as though a world had exploded; but we may add that the paths of these little planets have no point of intersection such as might have been expected had they originated in the break-up of a large body. The bulk of the asteroids all put together is less than that of the moon. They range from ten to one hundred miles in diameter. They are so small and their attraction of gravitation so slight that it is thought that a pebble flung with very ordinary force from any one of them would never fall to the surface again. Professor Young states that the orbits of the asteroids so cross and interlink that, if they were material hoops or rings, the lifting of one would take all the others with it.

Asthma, a disorder of the breathing apparatus. It is a nervous disease, resulting in a spasmodic contraction of the muscles of the bronchial tubes. When the muscles contract, the tubes are so nearly closed as to interfere with the process of breathing, and produce a characteristic wheezing noise. The shortness of breath and violent coughing are very distressing and are difficult to relieve. Rest and the inhaled smoke of cubebs are recommended by physicians.

Astig'matism, a defect of vision, due to a difference in curvature of the lens of the eye in various planes, which prevents one from seeing lines in those planes with equal distinctness though they may be equally distant from the eye. Any one may make a simple test for astigmatism by looking at black lines radiating from a center; if, for instance, the vertical lines appear much more distinct than the horizontal ones, the error in curvature may be corrected by glasses.

Astor, John Jacob (1763-1848), an enterprising American fur merchant. He was a native of Walldorf, near Heidelberg, Germany. The name, Americanized

by dropping out one l, has been given to various members of the family and is commemorated in the Waldorf, or rather the Waldorf-Astoria Hotel, New York City. Astor's boyhood days were spent laboring on a farm with his peasant father. At the age of sixteen he joined a brother in London, and engaged in the making of musical instruments. At twenty he came to New York and, through the advice of a fur merchant, engaged in that business. He gradually established fur trading posts throughout the Missouri region, at many points in the Rocky Mountains, and as far west as the mouth of the Columbia, where a trading post was named Astoria in his honor. Washington Irving has given a good account of this enterprise in his *Astoria.* Astor being a man of thrift, ability, and foresight, made a vast fortune which he increased by judicious investments in New York City real estate. This real estate is the basis of the present wealth of the Astor family. A very considerable portion of his fortune was left for various charitable purposes. Fifty thousand dollars went to the poor of his native village, Walldorf. A bequest of $400,000 was left to build the Astor Public Library, which stands on Lafayette Square. Washington Irving was the first president of the board of management. The endowment has been increased by liberal gifts from other members of the family.

William B. (1792-1875), a son of the John Jacob known as "the landlord of New York," amassed a fortune of $30,000,000. He added $600,000 to the funds of the Astor Library. William Waldorf Astor, a great-grandson of the first Astor, in 1890 inherited a fortune of $200,000,000, and removed to London, where he bought the *Pall-Mall Gazette.* In 1899 he renounced his allegiance to the United States. He virtually bought a title and seat in the English House of Lords. He died in 1919.

Astoria, Ore., founded in 1811 as a fur trading post by John Jacob Astor, was the first settlement in the Columbia River valley. At Astoria is Fort Clatsop, established in 1805 by the Lewis and Clark Expedition. The English gained possession of the fort in 1813 and renamed it Fort St. George, holding it until 1818. But the Northwest Company, English fur traders, occupied it until 1845. It is now a modern city, the county seat of Clatsop Co. It is on the south bank of the Columbia River, 100 miles northwest of Portland. It is the center of an extensive fishing and canning industry, and also controls a large export trade in lumber, wheat and flour.

On December 8, 1922, a disastrous fire, which destroyed forty blocks, swept the city. The whole business section as well as attractive portions of the residential sections were completely destroyed. This was the most disastrous fire which occurred on the Pacific Coast since the San Francisco disaster. Population, 14,021.

Astraea, in Greek mythology, the daughter of Zeus and Themis, and goddess of justice. During the golden age she dwelt on earth, but was placed among the stars, where she forms the constellation Virgo. The name was given to one of the asteroids, discovered in 1845. It revolves around the sun in 1,511.10 solar days, and is about 2½ times the distance of the earth from the sun.

Ovid, in his *Metamorphoses,* dwells on Astraea, the "star maiden," and how she grieved over the wickedness of men

Astrakhan, ăs-trȧ-kăn′, a chief city of the Volga basin. It is situated about thirty miles above the entrance of that river into the Caspian Sea. It is a dirty, ill-smelling city, with crooked, broad streets and irregular rows of houses. A cathedral is the only edifice of importance. A number of bridges span the river. Astrakhan carries on an immense trade in fish, caviare, and isinglass. The number of people engaged in the Caspian fisheries which have their center at Astrakhan is variously estimated at from fifteen to thirty thousand persons. There are also important manufactures of silks, woolens, cottons, soap, morocco leather, and shagreen. The curly, woolly sheepskins of Persia and Syria are called astrakhan from the fact that the pelts, tanned and ready for making overcoats and other garments, were obtained originally from this city.

Population, 163,800. See CASPIAN; STURGEON.

Astrakhan, ăs′trȧ-kăn, a name given to the skins of a species of Russian sheep, the distinguishing characteristics of which are short, fine, soft, closely curled wool. The skins which form the fur used for coats, sacques, muffs, etc., are from young lambs reared in the mountainous districts of Astrakhan. Astrakhan cloth is woven in much the same way as velvet or plush. An extra pile-warp of lustrous wool or mohair is added to a single cloth. If the curly effect of the real wool is desired, this warp or pile which is to form the face of the finished fabric is crimped or twisted before weaving. This crimping is done by machinery, and is "set" or made permanent by a steaming process. These crimped threads are then woven over wires in the form of loops, which are cut, or left uncut, according to the effect desired. Sometimes part of the loops are cut and a part left uncut, producing a variety of novelties for cloakings and other purposes. See FUR.

Astrology, the study of the alleged influence of the stars and other heavenly bodies on the life and destiny of persons. Thus a person born under the influence of Mercury had a mercurial temperament; if brought into the world when Jupiter was ascendant, he had a jovial disposition. From time immemorial the Chinese, Egyptians, Chaldeans, Greeks, and Romans were subject to the grossest delusions of this sort. On the supposition that the earth stood still while the heavens revolved, the rising and setting of the various stars was a great mystery. If the sky were full of charioteers, gods, serpents, animals, nymphs, bowmen, watermen, warriors, etc., as the names of the constellations would imply, it is no great wonder that they should be thought to have an influence dire or propitious, and that people without scientific knowledge should consider rain, drouth, plenty, famine, war, pestilence, health, disease, friends, enemies, life, and death, the heaven-sent gifts of the inhabitants with whom their imagination filled the sky. Even the Jews, the early Christians, and the scholarly Arabians, who had a more correct notion of the stars, still thought the heavenly bodies in their courses had a powerful influence on the destinies of the human race.

The medieval astrologer divided the heavens into twelve regions by as many lines or meridians running from pole to pole. These twelve regions or spaces were called houses. Named in order, they were the houses of life, riches, brethren, parents, children, health, marriage, death, religion, dignities, friends, and enemies. The house just below the horizon at the hour of one's birth was said to be ascendant or rising, and had the greatest influence. Each house was ruled by a powerful star. The stars and houses in the eastern horizon at the moment of birth were therefore of the utmost importance. The astrologers, it was believed, understood these influences and could cast the horoscope of an infant. By knowing the date and hour of birth they could work backward and determine, for instance, whether the house of war was for or against one.

Astrologers were persons of influence. They received large fees and gifts for their services. It is not difficult to understand how the grossest deception may have been practiced. A pretended astrologer in the service of a court might be the emissary of a foreign power sent for the very purpose of ingratiating himself that he might give readings calculated to lead his dupes into making blunders in warfare and statecraft.

It is difficult to realize that a large part of the time of the learned was devoted at one time to astrology and to alchemy, and that both had so strong a hold, not merely on the common people, but on the wisest men of medieval times. Astrology bears the same relation to astronomy that alchemy holds to the science of chemistry. It passed away with the acceptance of correct views regarding the daily rotation of the earth on its axis.

Some of the savage tribes of Asia and Africa are said to believe in a rude astrology still. Many once popular notions still linger, as that Friday is an unlucky

day for a journey, and that a rainy day is unlucky for a wedding. Some people think it useless to plant melon seeds except at certain time of the moon; others cannot make soft soap unless the moon is right.

Our vocabulary is indebted to astrology for many familiar words. To *consider* originally meant to view or study the stars. A *disaster* is the stroke of an evil star. A *disastrous* battle is due to an unfavorable star. A *saturnine* disposition is under the influence of Saturn. A *lunatic* is a moon-struck person. In Judges v: 20, we learn that "The stars in their courses fought against Sisera." Job asks, "Canst thou bind the sweet influences of Pleiades or loose the bands of Orion?" Napoleon believed in his star. The star of peace, an evil star, one's lucky star, the star of empire, are familiar expressions inherited from the astrologer.

A number of popular sayings connected with the month of the year have their origin, in all probability, in the old practice of astrology. Thus a girl born in January is likely to be prudent; in February, affectionate; in March quarrelsome; in April, fickle; in May, happy; in June, impetuous; in July, sulky; in August, practical; in September, popular; in October, coquettish; in November, kind; in December, extravagant. An old adage thus lays *down* the proper days for wedlock: Monday for wealth; Tuesday for health; Wednesday the best day of all; Thursday for crosses; Friday for losses; Saturday no luck at all.

Astronomy, the science of the heavenly bodies. Although astronomy in its present state of exactitude is of comparatively recent development, as the world goes, we have good evidence that the priests of Egypt had mapped out the stars into constellations and had divided the zodiac into twelve signs, as early as 3,000 B. C. Thus our oldest astronomical records are older than our oldest known code of laws, which dates from the time of Hammurabi, about 2250 B. C. The Babylonians and Chaldeans were astronomers of a sort, since the Greeks, Thales and Pythagoras in particular, credit them with astronomical knowledge. Pythagoras (582 B. C.), Ptolemy (150 B. C.), and many others among the ancients contributed somewhat to our knowledge of the heavens. Ptolemy, it is true, left a record of rather negative accomplishment, since his theory that the earth was the center of the universe around which the sun, moon and stars revolved was accepted for fourteen centuries by the Christian church and was the basis of almost all the persecution heaped upon such later investigators as Copernicus and Galileo. It was Copernicus, a Pole (1473-1543), who first showed that the sun is the center of our universe. Galileo, an Italian, (1564-1642), invented what was the first really practical telescope, and it was he who greatly developed the theories of Copernicus. No list of the astronomers is complete without the names of Tycho Brahe (1546-1601), the Dane; Johann Kepler (1571-1630), the German, and Laplace (1749-1827), a Frenchman, who propounded the nebular hypothesis. With the mention of Sir Isaac Newton (1642-1727), discoverer of the law of gravitation, the list of those who were preeminent in the field of early astronomical investigation is completed.

After astronomy had attained the dignity of a science among the learned men of Europe, it was rapidly developed. Ever larger and more powerful telescopes aid in mapping the heavens accurately; the development of astronomical mathematics advanced our knowledge of stellar speeds and distances; and lately, by means of the spectroscope and photographic negative, still greater knowledge of the heavens has been gained. Yet one man of science says in a recent work:

> The picture of the Universe that the astronomer offers us is imperfect; the lines he traces are often faint and uncertain. There are many problems that have been solved, there are just as many about which there is doubt, and notwithstanding our great increase in knowledge, there remain just as many that are entirely unsolved.

Since, however, the worth of science is calculated by the accomplishments it shows, a list of the accomplishments of the science of astronomy is interesting. Of the problems that have been solved, wholly or in part, the most important are the problem

of world origins, now generally explained by the nebular hypothesis, which says that a heavenly body is formed by the condensation of a nebula; the composition of heavenly bodies, as the sun, in which the element helium was discovered twenty years before it was found on the earth; the comparative ages of the stars and planets; the analysis of light, with the spectroscope; the fairly accurate calculation of planetary distances; the problem of photographing stars, comets, nebulae and planets; and the fascinating problem of there being life on other planets, as Mars.

Nebulae. A nebula is a dimly luminous patch in the heavens that resembles somewhat a thin wisp of smoke. Nebulae are composed of gases that are so rarified that the residual gas in a vacuum is dense in comparison. The distances from the earth of some of these nebulae are known, but their exact dimensions are not known, though they are known to be enormously large. Nor is it known what causes their luminosity. It is from these nebulae, by a process of condensation accompanied by a rotary motion, that astronomers suppose stars to be born. Their contentions are supported by the fact that some of the nebulae that have been photographed have distinct semi-solid cores—the nuclei of future stars.

The nebular theory, however, is no longer acceptable in its entirety to some astronomers, who modify it by holding that the solar system was formed from a spiral nebula composed of gas but carrying with it innumerable solid bodies called planetesimals, which, gathering together, formed into planets and their satellites.

Composition of Heavenly Bodies. It was through their luminosity, by means of the spectroscope, that the elements composing the sun and stars were determined. Every metal, when so heated that it becomes incandescent, emits light; and each metal displays its own distinctive color. So-called white light, when passed through the spectroscope, is broken up into many colors, corresponding to the substances or substances from which it emanates. It was thus that helium was discovered in the sun.

Comparative Ages of Stars. The comparative ages of stars are determined in a somewhat similar manner. The stars are roughly divided according to color into red, yellow and white stars. These are the colors to be seen in any metal in the process of heating, and in the process of cooling. It appears that when a star is first formed it is not very hot, and that it glows dully red; as it grows hotter and tends toward yellow, it contracts. At the white-hot point, heating ceases but contraction continues. Still further contraction accompanies the cooling process; and when the star is so cool that it is again red, it is much smaller than when it was first red. The red stars are therefore divided into two classes, giants and dwarfs. The giants are the youngest and the dwarfs the oldest stars. Their formation is generally explained on the nebular theory.

Planetary Distances. The development of instruments and of mathematics for the measurement of planetary distances and speeds is one of the highest triumphs of astronomy, but the subject is so technical that many volumes would be required for its complete elucidation.

A recently perfected method of calculating planetary distances has brought out the fact that Betelgeuse, the brightest star in the constellation Orion, is more than four hundred millions of millions of miles distant from the earth. Light, which has a speed of 186,000 miles a second, requires seventy years to travel from Betelgeuse to the earth. The distances of other stars may be calculated with equal exactitude by the same method.

Photography. Heavenly bodies are photographed and charted with the aid of the telescope. It was long since learned that the photographic plate records more accurately what the telescope sees than does the human eye; and that by long exposure, the plate will so accumulate faint impressions as to give a clear final picture, a feat impossible for the human eye to accomplish.

With such a telescope as the one on Mount Wilson, California—the largest and most powerful telescope in the world—a body like the moon can, in a sense, be brought to within about fifty miles of the

earth. At this distance a Zeppelin would be detected as a moving speck against the moon's surface, and a city the size of London would appear as a dark sprawling spot on the globe. It is of the moon that perhaps the best photographs have been made.

Life on Other Planets. Since the time when the doctrine of evolution became current intellectual coin, speculation has been rife as to the existence of life in some form on other planets, notably Venus and Mars. By the writers of Martian romances, "life" has always been made synonymous with "human life" as we on earth know it. More careful investigators, however, do not allow any such synonymity; for animal life depends for its support, finally, on vegetable life, while the latter depends only upon certain elements derived from the soil and the air; and good evidence of vegetable life on other planets is not forthcoming. Those who, on the other hand, deny categorically the possibility of there being some form of life on other planets because of the assumed absence of the conditions necessary for the support of life as we know it, do so without taking thought of the marvelous adaptability of both plants and animals. And thus they deny, by implication at least, the doctrine of evolution.

Through the medium of various astronomical publications, reports are continually coming of the death of old stars, the birth of new ones, the discovery of new comets, of new elements in old heavenly residents, and ever new photographs are given out. This ceaseless activity in the oldest of the sciences promises new accretions of knowledge in the future. See Pythagoras; Ptolemy; Copernicus; Galileo; Brahe; Kepler; Laplace; Newton; Planet; Satellite; Zodiac; Eclipse; Star; Sun; Aurora Borealis.

Asylum, a Greek word designating a temple inclosure within which refugees might seek protection. One who had killed another in self-defense might take refuge from the avenger of human blood in an asylum. If the refugee could make out a good case, the priests were required to protect him; otherwise he was delivered to the authorities for punishment. To violate an asylum, that is, to drag out by force one who sought protection, was an act of the utmost impiety, sure to be punished by the gods.

Among the Jews certain towns were designated as cities of refuge, "that whosoever killed any person unawares, might flee thither and not die by the hand of the avenger of blood until he stood before the congregation." Among those who might lay claim to the rights of asylum were slaves who had been cruelly treated by their masters, soldiers defeated in battle and pursued by the enemy, and criminals who wished to evade trial. In the Middle Ages many monasteries served as places of refuge. In days of murder and political revenge instances are not wanting of even kings taking refuge for the remainder of their days. The idea of "asylum, or refuge" originated in a state of society in which wrongs, real or fancied, were adjusted with a strong hand, a society in which established courts were wanting. The Cherokee Indians had a city of refuge on the Tennessee, where the murderer was safe. Even the white man who had taken the life of an Indian was safe "once his foot touched the soil of this city."

In modern times the term has been used to indicate a shelter or home for the needy, as, for instance, an orphan asylum. Most commonly, however, an asylum is a place for the safe keeping and care of the insane. In America each state and province makes liberal provision for insane asylums where the unfortunate are cared for at public expense. These institutions are sometimes called hospitals. See Insanity.

Asylum, Right of, in international law, a privilege accorded by the law of nations, or by custom to foreign legations to shelter within their precincts persons subject to the jurisdiction of the state in which such legation is maintained. The person taking refuge within the legation was deemed to have come under the jurisdiction of its flag, and so long as he remained there to be as exempt from legal process of the country as if he had escaped to the foreign territory represented by the legation, but the right, if it extends at all, is a right to extend protection, not to claim it.

As You Like It, one of Shakespeare's best known comedies. It was presented on the stage as early as 1600, but was not printed until 1623, when it appeared in the collection known as the "First Folio." The drama is founded on a novel by Thomas Lodge, but Shakespeare's "creative genius has surrounded a commonplace tale with an atmosphere of graceful romance." The scene is entirely in the open air; first a garden, then the lawn surrounding a palace, then, and for the greater part of the play, the forest of Arden. The plot is simple. It is the characters themselves that charm us; what they say, rather than what they do, that holds our attention. A quarrel between brothers, the daughter of an exiled duke disguising herself as a young forester, her interviews with her unsuspecting lover, the reconciliation of the brothers through "kindness, nobler than revenge," the four pairs of lovers that "join in Hymen's bands," the exiled duke finally restored to his own by the conversion of the usurper—such are the incidents of the play. But the wit and sprightliness of Rosalind, the frank sweetness of Celia, the coquettishness of Phoebe, the nobleness of Orlando, the wise folly of Touchstone—these are the things that charm. See ROSALIND; TOUCHSTONE; SHAKESPEARE; ARDEN.

It is the most ideal of any of Shakespeare's plays. . . . There is hardly any one of Shakespeare's plays that contains a greater number of passages that have been quoted in books of extracts, or a greater number of phrases that have become in a measure proverbial. If we were to give all the striking passages we should give half the play.—Hazlitt.

QUOTATIONS FROM "AS YOU LIKE IT."

Sweet are the uses of adversity.

Sucks melancholy out of a song as a weazel sucks eggs.

For in my youth I never did apply
Hot and rebellious liquors in my blood.
Therefore my age is as a lusty winter,
Frosty, but kindly.

True is it that we have seen better days.

Neither rhyme nor reason.

I would the gods had made thee poetical.

Down on your knees,
And thank Heaven, fasting, for a good man's love.

All the world's a stage,
And all the men and women merely players.

Men have died from time to time, and worms have eaten them,—but not for love.

How bitter a thing it is to look into happiness through another man's eyes!

There's small choice in rotten apples.

My cake is dough.

Atalan'ta, in Greek legend, a maiden of Arcadia. She had been warned by an oracle not to marry. She therefore avoided the society of men and gave herself to the pleasures of the chase. She was very beautiful, however, and had many suitors, upon whom she imposed the following conditions: "I will be the prize of him who shall conquer me in the race; but death shall be the penalty of all who try and fail." Many youths attempted the race, but Atalanta outran them all until Hippomenes appeared. He was a favorite of Venus, whose aid he invoked in order to win the race. The goddess gave him three golden apples, instructing him to throw them, one at a time, before Atalanta as she ran. She was attracted by the apples, paused, turned aside, and was thus overtaken by Hippomenes. The two were wedded and were very happy; but Venus, vexed because Hippomenes seemed ungrateful, caused the pair to be transformed into lions, destined henceforth to draw the chariot of Cybele.

Atchison, Kans., the county seat of Atchison Co., is beautifully situated on the "Great Bend" of the Missouri River, 20 miles above Fort Leavenworth. It was settled in 1854 by the pro-slavery party during the war between that party and the anti-slavery party for the control of the destiny of Kansas. It was named in honor of Senator D. R. Atchison, a vigorous leader of the pro-slavery party. Atchison is an important industrial center; population 12,630.

Athabas'ca, a river, lake, and region on the eastern slope of the Canadian Rockies. The river rises in the Rocky Mountains of Alberta, near the sources of the Saskatchewan, and flows in a tortuous, northerly direction into Lake Athabasca, whence its waters find their way ultimately through the Mackenzie River to the Arctic Ocean. Its length is about 600 miles, equal to that of the Seine and the Thames combined. Lake Athabasca is

about 200 miles in length with an extreme width of thirty-five miles. It is comparable in size to Lake Ontario. The district of that name was a quadrangular territory, comprising a quarter of a million square miles, lying east of British Columbia and extending from the sixtieth parallel of north latitude to Alberta and Saskatchewan. Athabaska is also the name of one of the high mountain peaks of the Canadian Rockies. Its height is 11,700 feet.

Athanasius (296-373), bishop of Alexandria and head of the Christian church in Egypt. He was a learned Greek. At the time when the struggle was on between the followers of Arius and the supporters of the doctrine of the Trinity, Athanasius was leader of the Trinitarians. He was obliged to flee more than once to the desert for his life. Now that theological controversy affords less delight than formerly, Athanasius is likely to be forgotten; but for centuries his writings were regarded as one of the bulwarks of the Nicene or Trinitarian faith. Athanasius is one of the men who stand high in the history of the Roman church. See NICE.

Atheism. See THEISM.

Athenaeum, the temple of Athena, or Minerva, at Athens, and elsewhere. As Athena was the patroness of learning and wisdom, Athena's temple was the resort of the poets, learned men, and wits of Athens, who there exchanged views and read their books aloud. In this way the literary people of Athens formed a sort of club. A school of rhetoric, with a regular staff of professors, established in Rome by the Emperor Hadrian, was known as the Athenaeum. A score of professors offered systematic study in oratory, rhetoric, philosophy, and jurisprudence. In modern times the name has become popular for libraries, learned associations, and literary journals.

Athene, a-thē′nē, or **Athena,** in Greek mythology, the goddess of knowledge and of righteous war, identified with the Roman Minerva. She personified not only mental acuteness, but also the clear upper air, and was clothed with the aegis, or storm cloud, and armed with lightning. She is often called Pallas Athene. See MINERVA.

Athenian Bee, a name conferred upon Plato, in allusion to the beauty and sweetness of his style. See PLATO.

Athens, the chief city of Attica, and the present capital of the modern kingdom of Greece. It was built on an irregular assemblage of hills in the sides of which explorers have found rock caves which may have been the homes of the original inhabitants. Historically, the city grew up around a central acropolis or hill. The Acropolis of Athens was a craggy rock about 150 feet high, with a flat summit 1,000 feet long and half as wide, accessible on one side only. It was an admirable place of refuge. The city which grew up about its base was four or five miles distant from the sea. In the course of time it was surrounded by a strong wall.

Notwithstanding their inland location, the Athenians became noted as the boldest sailors and the most enterprising merchants of Greece. Three harbors were improved; the most important of these, the Peiraeus, was fortified by Themistocles with a massive wall of masonry, sixteen feet broad and thirty feet high. The blocks of stone were clamped together with iron. To connect the city of the Acropolis and the city of the harbor, the Athenians built long walls, inclosing a lane five miles long and 550 feet in width. These walls were made so broad and massive that their tops served as carriage roads. At the height of Athenian power, which may be placed at 460 B. C., Athens not only monopolized the greater part of the commerce of the Mediterranean but reduced no less than 280—Aristophanes says 1,000—other Greek cities to the position of allies and required them to pay tribute. An immense amount of treasure was thus brought into the public coffers and was expended in magnificent public buildings. Athens became the world's metropolis, the center of art, literature, and science.

Athens possessed the finest public buildings of the ancient world. There were several open air auditoriums, designed for public assemblies, musical recitals, and the presentation of dramas. A semi-circular excavation was cut in the side of a hill,

resembling one-half of a saucer or shallow cup. The natural stone was left in terraces to serve as seats, or terraces were built of marble slabs in the shape of steps. Sometimes a stone wall was built across the open space from end to end of the arc. A table of masonry at the middle of this wall, attained by steps, served as a platform for the speaker. In speaking he faced the hill. In the case of a theater the wall was replaced by a building which served as a retiring room for the actors. The performances, however, were given in the open air. The greatest of these audience rooms is said to be the Stadium. It was finished in Pentelic marble and was capable of seating 40,000 persons. Another famous place of public assembly was the Pnyx (nix) on a low hill. The venerable Areopagus had an open air auditorium of its own.

The temple of Theseus, like other important buildings, was constructed of marble. It is still in a tolerable state of preservation. Every alternate slab of stone in its frieze is devoted to a representation of the heroic deeds of Theseus and Hercules. A temple of Jupiter was 354 feet long and 171 feet broad. It was adorned with 120 magnificent Corinthian columns, 61 feet in height and over 6 feet in diameter. Sixteen of these still stand. This was the largest and most magnificent temple of Zeus ever erected. The famous statue of the Olympian Jupiter was sheltered here. It was made in ivory and gold by Phidias, the most celebrated sculptor of antiquity.

The crowning architectural glory of the city was a group of buildings on the Acropolis. As stated, this could be approached only on the western slope by a passage 160 feet in breadth. A magnificent marble vestibule fifty feet deep was built across this entire width, with a wing at either end, the entire edifice presenting a colonnade supported on Doric columns. A carriageway thirteen feet wide passed through the center. Two ways of less width led between columns along either side. The summit of the Acropolis was adorned with many temples, altars, and statues, including the colossal bronze figure of Athena, at least fifty feet in height. One of the principal buildings was the Erechtheum. It was one of the most graceful examples of the Ionic order. A porch is especially celebrated, being supported by six columns, representing perfectly proportioned, chastely clad female figures in marble, called the Caryatides. The greatest building of all was the Parthenon, still considered the crowning effort of Grecian architecture. The pillars were of the Doric order. It was sacred to Athena, the patron goddess of the city.

Other famous places which the student now finds it difficult to locate were the Agora, or public market place, with tree-lined walks; the Academy, with its groves and walks and fountains where Plato taught; and the Lyceum, the no less celebrated haunt of Aristotle.

During the Roman occupation of Greece, particularly during the reign of the Antonines, the buildings of Athens were guarded with care. Several hundred years after it had been begun, the Emperor Hadrian himself gave orders for the final completion of the temple of Zeus mentioned above. A triumphal arch in Hadrian's memory still stands in the vicinity. With the removal of Roman protection, however, the art treasures of Athens were pilfered by the East and by the West. Many were carried to Rome and to Constantinople. The choicest sculpture was used to build garden walls or to construct huts. The marble steps of the Stadium were quarried like common rock for the most ordinary building purposes.

Under Turkish rule Athens became a mass of tumble-down ruins, inhabited by a few wretched people, still clinging to the scenes of magnificence witnessed by their once proud ancestors. The Parthenon became at one time a church of the Virgin Mary, and the Arabs turned it into a mosque. It remained almost intact until 1687. During the siege of the city by the Venetians it was partially destroyed by an explosion of powder.

A large number of the finest pieces of sculpture, particularly blocks of the friezes, were taken from the Acropolis early in the nineteenth century and are preserved

in the British Museum. The porch of the Caryatides still stands. Travelers speak with admiration also of a Temple of the Winds, yet found in a tolerable state of preservation. It is an octagonal marble building, formerly surmounted by a bronze weather vane. Each of the eight faces of the cornice bears a figure of the wind god of the quarter toward which it turns. Boreas, the north wind, on the northern cornice, is represented as blowing a noisy conch. Notus, the rainy south wind, carries a water jar. Zephyrus, the west wind, has a lap full of flowers. Within the tower, the architect constructed a water clock, or clepsydra, supplied with water from a spring on the Acropolis.

Modern Athens is well equipped with public schools and institutions of learning. Aside from the elementary schools, there are the Government Commercial School and the two universities—the National and the Capodistria—the former founded in 1836. Together, these two universities have 56 professors, 106 lecturers, and 3,250 students studying medicine, law, philosophy, theology and chemistry. Of the whole number, 800 are from abroad, chiefly from Turkey. The polytechnic, has 22 professors and 170 students, this school having faculties of painting, sculpture, mechanics, architecture, surveying, and similar subjects. The expense of primary education is borne by the State.

Modern Greece is jealously safeguarding and preserving the remaining architecture, sculpture and other treasures from her glorious past. The Ministry of Education is in charge of the Service of Antiquities, which is managed by an Archaeological Council, which is responsible for the conservation and reparation of all antiquities from any period (Prehistoric, Classical, Byzantine and Mediaeval).

Athens, Ga., a cotton market and manufacturing center, 69 miles east of Atlanta on the Oconee river. It is the county seat of Clarke Co. In the city are the University of Georgia, the Georgia State College of Agriculture, the Lucy Cobb Institute for Girls, and a State Normal School. Here also is the famous "tree that owns itself," a tree to which 16 feet of land were deeded by Col. W. H. Jackson. The population in 1920 was 16,748.

Atherton, Gertrude Franklin (1857-), probably the most important American female author. She was born in San Francisco, Cal. She is a great-grand niece of Benjamin Franklin. All her works are serious, and are marked by breadth of learning, vigor of style, and independence of thought. She has at least 30 books to her credit, imporant among which are *The Conqueror,* a story of the life of Alexander Hamilton; *The Californian,* and *Ancestors,* the scenes of which are laid in her native state; *Senator North,* a picture of social and political life in Washington, D. C.; *Julia France and Her Times; Sleeping Fires;* and *Black Oxen,* 1923.

Athletics, the art or practice of athletic games or exercises. The distinction between athletics and gymnastics is not clear. Among the Greeks, who led the world in physical training, as they did in sculpture, architecture, and literature, the athlete was one who contended in games for a prize; the gymnast was a trainer of professional athletes. Homer describes athletic games in the *Iliad;* Plato, Aristotle, and other ancient writers considered athletics a necessary part of an education. The Greek cities, particularly Sparta and Athens, had large buildings and grounds for the training of the youth in athletic exercises, and gave the subject a large place, the lion's share, in fact, in their system of education. Such a building was known as a gymnasium (plural, gymnasia). The academy in which Plato taught, and the lyceum in which Aristotle lectured, were gymnasia. The Greek gymnasium was placed in charge of a chief gymnast, who was assisted by four instructors. Physicians were in attendance to adapt the physical exercises to the endurance of each student. Baths both hot and cold were provided. There were exercises in tumbling, dancing, running, leaping, climbing ropes, springing from the knees, jumping on slippery objects without falling, wrestling, and throwing the discus. Rowing, swimming, swinging, riding, and driving were prescribed forms of outdoor exercise.

At regular intervals national games were held, at which representatives of the different gymnasia contended for prizes. The winner of a general prize was carried home in triumph by his townsmen, given the freedom of the city, and not infrequently maintained at public expense.

During the Middle Ages young squires who were candidates for knighthood were given a thorough training in running, leaping, throwing weights, wrestling, boxing, hurling the lance, leaping to the back of a horse and leaping down again, and, above all, practice in the use of the lance and sword. In short, no pains were spared in the physical training of a young man intended to wear the heavy armor and assume the responsibility of a knight.

Of modern nations, the Germans have been the most systematic in physical training. Turners' societies are general, not only in Germany, but in all parts of the world where Germans have colonized. As a matter of fact, however, the British are the most athletic of modern people. While the British games lack the system and the formality to be found among the Germans, they are all the more heartily entered into. The spirit of Hughes' *Tom Brown at Rugby,* the hearty enjoyment of sport and the peculiar pleasure of it, is more manifest in England, Scotland, and Ireland than in any other part of the world. Boating, foot racing, wrestling, boxing, quoits, football, cricket, jumping, rolling the hoop, playing hare and hounds, prisoner's base, and other games calling for a less degree of physical exertion, have been favorites in the British schools and among the young people for generations. Modern wrestling, if we overlook the Japanese jiu-jitsu, is a British art. In fact, each county has its particular style of wrestling and tripping. In Lancashire, the catch-as-catch-can style; in Cumberland and Westmoreland, the back-hold system; in Devon and Cornwall, the catch-hold, etc. The colonial fondness for wrestling in New England, Kentucky, and elsewhere may be traced to that of the mother country.

During the early years of our republic, so long as agricultural employment was nearly universal, it was considered that work on the farm, in the shop, and in the kitchen gave all the exercise requisite to good health. Of late years, however, the universities, colleges, high schools, and academies, supplemented by the efforts of the Young Men's Christian Association, have established gymnasia for physical training. Dumbbells, Indian clubs, bars, wands, parallel bars, flying rings, ladders, climbing ropes, springboards, and tumbling mats have been provided. Various contrivances for expanding the chest and strengthening the muscles of the body have been devised. Many of the larger gymnasia, as at Harvard and Michigan, have large indoor tracks. Hockey, golf, cricket, lawn tennis, and baseball, have become widely popular. Athletic contests between classes, schools, colleges, and universities have become general. Field day is one of the most interesting parts of commencement week. The Amateur Athletic Union of the United States has adopted rules for baseball, bicycling, boating, bowling, cross country running, football, handball, hurdle racing, jumping, lacrosse, lawn tennis, pole vaulting, putting the weight, quoits, racket, running, skating, sculling, swimming, throwing the hammer, throwing weights, tug-of-war, and walking. There are several subordinate associations covering the states of the Union.

A few amateur world's records may be of interest. The jumping records were made without weights.

100 yard dash	9 2/5 sec.
1 mile run	4 min., 12 3/5 sec.
100 mile run	13 hr., 26 min., 35 sec.
120 yard hurdle race	15 sec.
220 yard hurdle race	23 3/5 sec.
Standing high jump	5 ft., 5¾ in.
Running high jump	6 ft., 7 5/16 in.
Standing jump, for distance	11 ft., 6 in.
Running jump, for distance	25 1/3 in.
Standing hop, step and jump	30 ft., 3 in.
Running, hop, step and jump	50 ft., 11 in.
Pole vault	14 ft., 4 in.
Throwing 12 lb. hammer	213 ft., 9⅛ in.
Throwing 16 lb. hammer	189 ft., 6½ in.
Putting 12 lb. shot	55 ft., 11¾ in.
Putting 16 lb. shot	54 ft., 4 in.
Walking 1 mile	6 min., 29 3/5 sec.
Discus throw	155½ ft.
Walking 10 miles	1 hr., 17 min., 40¾ sec.
Walking 100 miles	21 hr., 42 sec.
Walking 1 hour	8 mi., 270 yards

An all-round athlete 5 feet 10 inches in height is considered well built if his measurements are approximately: Weight, 155 pounds; chest measure, 39 inches; waist measure, 29 inches; hip measure, 37 inches; thigh measure, 22 inches; calf measure, 14½ inches.

In 1896 an international Olympic committee arranged for a revival of Olympic games. The first meet was held at Athens. The second was held at Paris in 1900. The third was held in connection with the Louisiana Purchase Exposition of 1904 at St. Louis.

The 1920 Olympic games were held at Brussels, Belgium. On June 3, 1921, it was announced that the 1924 games would be held at Paris, and the 1928 games at Amsterdam. Because of the World War no games could be held in 1916. The Olympic games for 1912 were held at Stockholm.

Atkinson, Edward (1827-1905), an American economist, was born at Brookline, Mass., and educated in private schools. Mr. Atkinson was for many years connected with manufacturing companies, and for some years after 1878 was president of the Boston Manufacturers' Mutual Fire Insurance Company. His reputation, however, is based upon his writings on economic subjects. He wrote articles, pamphlets, and books on banking, railoards, economic legislation, tariff, money, fire-prevention, competition, industrial education and colonial expansion. Mr. Atkinson opposed with vigor the war in the Philippines, and during 1899-1900 published the *Anti-Imperialist* in support of his opinions. His more important works are *Cheap Cotton by Free Labor, The Industrial Progress of a Nation, Reform of the Legal Tender Act, Science of Nutrition, Distribution of Products, The Margin of Profit,* and *Facts and Figures the Basis of Economic Science.*

Atlanta, the capital of Georgia, is situated at the southwestern angle of the Appalachian Mountains on the ridge that divides the waters of the Gulf from those that flow toward the Atlantic. The first house was built in 1836. The population in 1860 was about 11,000. During the Civil War, General Sherman occupied Atlanta after a siege of several months, and set out from this point on his march to the sea. He himself compared the strategic position of the city to a wrist, the fingers of which reach to the various ports on the Atlantic and the Gulf—a description which suits the commercial situation as well. The Cotton Exposition of 1881 attracted general attention to the commercial possibilities of Atlanta and the agricultural resources of the vast, fertile region which surrounds it. Ten radiating lines of railways have united in building a union station costing $900,000.

Atlanta ranks high as an exporting center for cotton, tobacco, grain, horses and mules. Her tobacco trade is the largest south of Richmond, Va., and she is the second largest mule market in the United States. Hydro-electric power is developed from the Chattahoochee River, which has here been dammed and otherwise improved. Atlanta's factories produce cotton goods, flour, furniture, shoes, cottonseed oil, lumber, patent medicines, agricultural and other machinery, clothing, steel products and fertilizer. Because of her advantageous position her industrial importance will continue to increase. In 1850, the population of Atlanta was only 2,572; in 1920, it was 200,616.

Notable among the educational institutions are the Georgia School of Technology which is a branch of the State University; Emory University, which has recently added departments of law, medicine, dentistry, and education; Agnes Scott College, recognized as one of the leading institutions in the South for the education of women; Oglethorpe University, the Alma Mater of Sidney Lanier, and the Atlanta School of Medicine. The public school system is organized on the most modern plan, beginning with the kindergarten and extending through six years of the elementary school, three years of the junior high school and three years of the senior high school. The following institutions are devoted to the higher education of negroes: Atlanta University, Clark University, Moore House College, Morris Brown College, Spellman Seminary and Gammon Theological Seminary.

Atlanta is situated 1,000 feet above sea level, and its temperature varies between 44° in winter and 77° in summer. It contains a parked area of about 850 acres, as well as numerous golf courses, country clubs and other places for recreation.

The most striking buildings are the capitol, completed in 1889 at a cost of $1,000,000; Fulton County ,Courthouse recently completed at a cost of $3,000,000; the Federal Building, the Union Station, and the Federal Prison, one of the three in the United States.

Because of its progressive spirit Atlanta is sometimes referred to as the "Chicago of the South." It was the home of Henry Grady, of Joel Chandler Harris, "Uncle Remus," and many other distinguished men and women.

See GEORGIA; COTTON; SHERMAN.

Atlantic Cable. See CABLES.

Atlantic City, a seaport of New Jersey and the most important all-the-year-round resort in the United States. It is built on Absecon Beach, a narrow, sandy island ten miles in length, and lying about five miles from the mainland of southeastern New Jersey. The climate is so mild and the accommodations so good that Atlantic City is popular in mid-winter. There are several miles of beach suitable for bathing, while boating, fishing, and hunting furnish amusement. The streets of the city are broad, and bear the names of the various states of the Union. Eight miles of board walk, twenty to sixty feet wide, furnish a popular promenade along the beach. It is known everywhere as "The Board Walk." Steam and electric railroads traverse the sixty miles between Philadelphia and Atlantic City, and magnificent express trains make daily trips. Trains run into the city also from New York, Washington, and Pittsburg. The Atlantic City Hospital, the Children's Seashore Home, and the Mercer Memorial Home for Invalid Women are situated here. There are about eight hundred hotels and boarding houses, among them some of the largest and best equipped on the coast. The resident population was, in 1920, 50,682, while the transient population in summer amounts to six or seven times that number. transient population in summer amounts to 300,000 or 400,000.

A number of large recreation piers extend into the sea, among which Young's Pier is the most widely known. Boating and bathing facilities are unsurpassed and during the season it is estimated that 100,000 persons enjoy the surf daily. Fishing and hunting are other favorite sports and the city has an excellent country club.

Atlantic City is of comparatively recent growth. While the first settlers appeared in 1780, only seven houses were standing in 1852. Two years later the Camden & Atlantic Railroad was completed and this gave the town the first start. The name, Atlantic City, was adopted and plans for making a summer resort here were rapidly developed. In 1902, the city suffered from a disastrous fire, but the damaged buildings were quickly rebuilt.

Atlantic Ocean, The, so named from Mt. Atlas, the vast body of water situated between the continent of America on the west and Africa and Europe on the east. Geographers usually consider the Arctic and Antarctic circles as its polar boundaries. The area is about 25,000,000 square miles. Its breadth in a direct east and west line varies. The distance from the most easterly point of Brazil to the African coast is 1,730 miles; from Florida to the African coast 4,150; and from Greenland to Norway 930. The eastern coast line is over 30,000 miles in length, the windings of the Mediterranean included; the western coast is over 55,000 miles in length if carried into all the gulfs and bays. The entire coast line of the Atlantic equals that of the Pacific and the Indian Oceans combined. The greatest depth thus far found, 27,366 feet, is not far to the north of Porto Rico. This depression is exceeded only by the altitude of Mt. Everest and two of its neighbors in Central Asia. The South Atlantic appears from soundings to be separated from the North Atlantic by a ridge running from Ascension Island to St. Paul. Soundings connected with the laying of cables have determined the fact that the North Atlantic is divided into

two broad north and south valleys, each 500 miles wide, by an intervening ridge or plateau 400 miles wide, the ends of which appear to rest at Iceland and the Azores. The waters of the tropics are denser and contain more salt than is found to be the case nearer the equator or toward either pole. The salt of the ocean is said to be somewhat more than one-fortieth of its entire weight. Deep sea dredgings reveal the fact that the bottom is covered with a soft ooze, the product of minute shells, the covering of microscopic animals.

The currents of the Atlantic may be dismissed as too complex for description within the limits of this article. In the simplest words, a powerful equatorial current following the equator westward splits on the eastern shoulder of South America. The southeastern branch runs southward along the coast of Brazil and forms an eddy or circuit in the South Atlantic, rejoining the equatorial current again off the coast of Africa. The northern branch coasts along the northern shore of South America, enters the Caribbean, and emerges from the great bay as the Gulf Stream. In its northeasterly course this stream branches and sends a current along the western coast of Greenland; another follows the western coast of the British Isles and Norway; and the third, reinforced by an undertow of Arctic waters, sweeps southward east of the Azores and past the coast of Guinea to complete the northern eddy and join the equatorial current.

The Atlantic is a stormy sea. Its waters are full of life. Whales, porpoises, sharks, vast shoals of herring, mackerel, and cod are found in its shallows, and its shores are thronged with gulls, cormorants, and all sorts of sea birds. Though not the largest or the deepest ocean, the Atlantic receives eighteen out of thirty-three, or over half of the world's great rivers.

Atlantis, a mythical island in the far west, mentioned by Plato and other writers. Some scholars have claimed that the belief in Atlantis was founded on hints of the existence of the far off continent of America. Geologists admit that there is evidence of the former existence of a tract of land west of the entrance to the Mediterranean Sea, but they claim that it subsided beneath the waves before the dawn of history or even possible tradition.

Atlas, a mountain chain in northwestern Africa. It runs from the Atlantic to the Mediterranean, traversing Morocco, Algeria, and Tunis. The system consists in the main of two mountain folds. The little Atlas is nearest the sea coast; the great Atlas borders the Sahara. The two folds are separated in places by sandy plains, a hundred miles wide, and again they knot together. The highest peak of the little Atlas rises to a height of 7,611 feet; the highest peaks of the great Atlas are from 11,000 to 14,600 feet high. The range reaches its greatest altitude in Morocco. The mountain folds are composed chiefly of limestones, clays, schists, and gneiss. There are veins of copper, iron, silver, and lead. The Atlas region is not particularly deficient in moisture. There are sections of great fertility. The mountains are covered for the most part with forests of oak, pine, poplar, and wild olives. Grasses, shrubs, and flowering plants abound. The loftiest summits rise above the timber line, and, though in a sub-tropical latitude, they are seldom without a covering of snow. Numerous rivers rise in the mountains, but all are short. Those on one side reach the Atlantic or the Mediterranean. Streams on the other side are lost in the sands of the Sahara. Springs reappearing give rise here and there to an oasis. The range is by no means formidable to travelers. Caravans, following well known lines of travel, wind through rocky defiles. The French coast is well provided with railways. Several long spurs reach up into the more populous interior, but no line (1910) has as yet crossed the main range into southern Algeria. See MOROCCO.

Atlas, in Grecian mythology, one of the Titans. He was the son of Japetus and Clymene, and married Pleione, daughter of Oceanus. The details of the myth vary greatly. According to Hesiod, Atlas took part in the Titan War. The victorious Zeus condemned him to stand at the western extremity of the earth, and support the sky on his shoulders and hands.

Hawthorne retells the story in *The Wonder Book*. While searching for the golden apples of the Hesperides, Hercules came to Atlas, who offered to get the apples if Hercules would only relieve him of his burden. This Hercules agreed to do. But Atlas, although he brought the apples, as he had promised, was unwilling to resume his task. Hercules cunningly appeared to submit; but he asked Atlas to hold the sky just a minute, that he might assume a more comfortable position. Atlas innocently consented. Hercules seized his golden apples and escaped. Another story is that Atlas was a rich king, living in that part of the earth where the sun goes down. He was larger than all other men. Perseus, after the slaughter of Medusa, paused for rest and food in the kingdom of Atlas. The king, fearing that he would be robbed of the golden apples in his garden, which were his special pride, refused to receive the guest. Perseus, turning away his own face, held up the Gorgon's head, which he carried with him. This possessed the same power in death that it had had in life, and Atlas was changed into stone. His beard and hair became forests; his shoulders, huge cliffs; his head a summit. Upon the mountain thus formed from his great bulk, it pleased the gods to rest the sky.

The word atlas in anatomy designates the first vertebra of the neck, which supports the head. The name is, of course, derived from the old legend of Atlas supporting the sky. Our use of the term atlas to designate a volume of maps sprang from the customary employment of a figure of Atlas crouching beneath his burden to adorn the margin of a map or to fill in a blank space.

Atmosphere. See AIR.

Atoll. See CORAL.

Atomic Theory. See CHEMISTRY.

Atropos. See FATES.

Attar of Roses, a fragrant oil obtained from the petals of roses. The fragrance of a rose is due to microscopic globules of oil that evaporate freely. Attar is combustible. A district near Benares, India, is famous for rose gardens. Attar of roses is extensively produced near Damascus and in Cashmere. It is a favorite perfume of the wealthy Turks, Persians, and Hindus. The attar requires so many roses that it is exceedingly expensive. Some 400,000 roses are required to produce an ounce of pure attar worth perhaps $80 or $100. Only a few of the cultivated varieties of roses are used in producing the oil. During the season the roses are gathered daily. Buds that open in the morning are picked before the midday sun dissipates the fragrance. The fragrant portions of roses are put into a closed still, and are boiled in water,—in a teakettle with a tight lid, as it were. The minute globules of fragrant oil in the petals are broken up and the oil escapes with the steam through a pipe into another receptacle, where, on the steam cooling, the oil floats on the water and may be poured off into small vials for shipment. The water the petals are boiled in also retains a part of the fragrant oil and may be sold as rose water. See PERFUMERY.

Attention, self-direction of the mental activities to a definite object of thought. The problem of attention is one of comparative recent recognition among psychologists, although traces of it are found in the older works, particularly the descriptive works of the eighteenth century. Although neglected for so long a time, attention has become the subject of a somewhat extensive pedagogical literature. It is now considered one of the most important activities of the mind. Most modern authorities recognize three phases of attention—passive, active and secondary passive. Passive attention is non-voluntary or spontaneous. The active or voluntary phase is directed by the will for a definite purpose; the secondary passive phase is habitual and acquired through environment and experience.

These phases are best illustrated by a concrete case: A boy on the bank of a shallow stream was attracted by a sparkle of light on the water's edge (passive attention). His curiosity was awakened and he sought the cause of the phenomenon (active or voluntary attention). He found that the beam of light was caused by a glassy crystal embedded in a small fragment of rock. His curiosity was not satis-

fied and he decided to learn what the substance was, so he took the rock to school and asked his teacher about it.

The teacher answered the question in such a manner as to awaken an interest in rocks on the part of nearly all his pupils, and they decided to devote a portion of their time each week to the study of rocks. But the subject was new and those who volunteered to engage in the study at first found it required effort to keep their attention upon it. Each day, however, they discovered something new, and were surprised at the many relations rocks sustained to other subjects. With these discoveries interest increased, and less effort was required to hold the attention upon the subject. Voluntary attention was yielding to secondary passive attention. The pupils were becoming amateur geologists.

Non-voluntary attention is characteristic of the young child. Voluntary or active attention is associated with the acquisition of every new idea and leads us on in every new experience. Secondary passive attention is the power of a trained mind which can bring to bear upon any subject the wealth of knowledge and experience acquired through the life-time of the individual.

Development of Attention. The mind develops through contact with external objects with which it comes in contact. through the special senses. Some impressions are stronger than others, and these are the first to attract attention. Every moment that we are awake the attention is active. Consciousness and attention are inseparable. There is a constant struggle on the part of sensations to survive in consciousness. Only those which we allow to obtain a hold upon the attention remain. The child's attention at first flits from one impression to another, until it lays hold upon one that is of interest. Then it becomes purposeful and is fixed for a short time upon that impression. An idea is gained and lodged in the memory. Recurrences of this impression bring into consciousness the former experience and the attention is more easily fixed upon it. The new idea remains in the focus of consciousness for a longer time and additional qualities are discovered and the idea is enriched by the second and each succeeding experience.

Attention is given to those impressions which make the strongest appeal to the child's nature. In other words, attention is attracted by interest. Without interest the attention can be held upon an object for a short time only. Interest develops attention and attention increases interest because the longer we study an object the more fully we bring our mental powers to bear upon it, the more qualities and relations we discover in it. At first we hold our attention upon a new subject by will power, but as interest develops the effort required to fix attention upon the object lessens until attention becomes habitual. Attention follows the law of habit, and secondary passive attention is essential to progress in the acquisition of knowledge, as well as in other fields of endeavor.

Attica, the southern peninsula and the most famous district of ancient Greece. It is still a land of mountain and plain, of the olive tree and the grape, of oil and wine. It was noted among the ancients for "inhabitants ever seeking some new thing." The political supremacy of ancient Greece was due largely to the seafaring enterprise of the inhabitants of Attica. It is still a geographical division on the map of modern Europe, but its glory lies in the past. No other area so diminutive in size is associated with so much of the world's art, literature, and history. Mt. Pentelicus, noted for its marble; Mt. Hymettus, for its honey; the Plain of Marathon, for the defeat of Darius' army; Eleusis with its mysteries; "the rocky brow which looks o'er sea-born Salamis"; and Athens, itself, "the eye of the world," are some of the names which make Attica famous. It has an area of 2,000 square miles, and a present population of 250,000 engaged in wresting a living from rather barren mountain slopes and a thin, sandy, stony soil. The complete destruction of forests has allowed freshets and torrents to carry away the soil and leave many a hillside bare. Historic fountains and vales, noted in myth and poetry, are re-

duced to prosaic, dry, rocky gullies. See GREECE.

Attic Bee, an epithet applied in ancient times to Sophocles, on account of the sweetness and beauty of his writings. For a somewhat different view, see article on SOPHOCLES.

Attic Muse, a name given by the Greeks to the historian Xenophon, whose style was regarded as a model of elegance. See XENOPHON.

Attila (406-453 A. D.), the famous king of the Huns. He is termed "The Fear of the World," "The Scourge of God." He is described as a strongly built man with a large head, flat, wide nostrils, and small, glittering eyes. He is reputed to have had arms so long that he could almost catch up stones without stooping. He was a man of imposing and even ferocious aspect and was followed by his soldiers with implicit confidence. So complete was the devastation caused by his army, that it was his constant boast that grass never grew where the hoof of his horse had trod.

The Huns were an Asiatic people of Tartar affinity, entirely distinct from the Slavs, the Teutons, and the Romans. They appeared in Europe about 400 A. D. The nations of Europe made common cause against them. Attila led a force estimated at 700,000, though this is probably an exaggeration, westward through Germany, crossed the Rhine, and drove the Burgundians before him as far as Chalons, where he was opposed by the united military forces of western Europe. Burgundians, Franks, Romans, and Goths united to fight the battle of Europe against Asia. A million men, if we may believe such a battle possible, are said to have engaged in a hand to hand conflict. Bowmen, spearmen, and swordsmen, horse and foot, fell in battle. Theodoric, the Goth, fell. European chroniclers claim that 300,000 Huns were left on the field of battle. The Hunnic tide was rolled backward. Aëtius, "the last of the Romans," followed the sullen horde of the Huns as they retired slowly toward the east. Subsequent attempts at invading Italy proved a failure; partly, as has been suggested, on account of pestilence and fever, which broke out in the camp of Attila. Attila is said to have died through the bursting of a blood vessel. He was buried with great ceremony and pomp by his followers. The empire of Attila was broken into fragments after his death and ceased to be a menace to European civilization.

See VENICE; HUNS.

Happily the peoples of the West realized their danger and laid aside all small rivalries to meet it. Theodoric, the hero-king of the Visigoths, brought up his hosts from Spain to fight under the Roman banner. Burgundian and Frank rallied from the corners of Gaul and Aëtius, "the last of the Romans," marshaled all these allies and the last great Roman army of the West against the countless Hunnish swarms reënforced by Tartar, Slav, Finn and even by tributary German peoples. The fate of the world hung trembling in the balance, while the great "battle of the nations" was fought at Chalons. United though they were, the forces of civilization seemed insignificant before the innumerable hosts of the Asiatics.—West, *The Ancient World.*

That is the Hunnenschlacht; "a battle," as Jornandes calls it, "atrox, multiplex, immane, pertinax." Antiquity, he says, tells of nothing like it. No man who had lost that sight could say that he had seen aught worth seeing. A fight gigantic, supernatural in vastness and horror, and in the legends which still hang about the place. You may see one of them in Von Kaulbach's immortal design—the ghosts of the Huns and the ghosts of the Germans rising from their graves on the battle-night in every year, to fight it over again in the clouds, while the country far and wide trembles at their ghostly hurrah.—Kingsley, *Roman and Teuton.*

It was the perpetual question of history, the struggle told long ago by Herodotus, the struggle between Europe and Asia, the struggle between cosmos and chaos—the struggle between Aëtius and Attila. For Aëtius was the man who now stood in the breach, and sounded the Roman trumpet to call the nations to do battle for the hopes of humanity and defend the cause of reason against the champions of brute force. The menace of that monstrous host which was preparing to pass the Rhine was to exterminate the civilization that had grown up for centuries . . . and to paralyze the beginnings of Teutonic life. . . . But the interests of the Teutons were more vitally concerned at this crisis than the interests of the empire. . . . Their nascent civilization would have been crushed under the yoke of that servitude which blights, *and they would not have been able to learn longer at the feet of Rome the arts of peace and culture.*—Bury, *Later Roman Empire.*

Attorney-General, a legal officer of high rank. In England the term is ap-

plied to an officer of the crown. The attorney-general of the United States is the fourth member of the president's cabinet. He has general supervision over the attorneys and marshals of all the districts in the United States and territories. A similar officer in each state of the Union has general charge of the legal business of the state. In case an officer of the government is in doubt, the attorney-general's interpretation of a law is binding until the courts have ruled otherwise. A treasurer, uncertain, for instance, whether the law directs him to pay out certain moneys, may do so with full authority if advised by the attorney-general that such is, in his judgment, the proper interpretation to be placed upon the legislative act in question. A similar officer is called the county attorney.

Atwood, George (1746-1807), an English mathematician and inventor. He was educated at Westminster School and at Trinity College, Cambridge, in which he was afterward a tutor. He was a fellow of the Royal Society of London, and held a position in the British patent office under Mr. Pitt. He contributed a number of papers to the *Philosophical Transactions,* also some treatises on philosophical subjects. He is of interest to the schoolboy as the inventor of Atwood's machine, a device to verify the laws of the acceleration of motion for falling bodies.

Auburn, the scene of Goldsmith's *Deserted Village.* "Sweet Auburn, loveliest village of the plain," is understood to be the village of Lissoy in the central part of Ireland. Nearly every state in the Union has an Auburn. The largest of these is Auburn, New York.

Auburn, New York, the county seat of Cayuga County. It is a well built, prosperous city of 36,192 people, engaged largely in manufacturing. A fine waterfall furnishes power and a state prison part of the labor. It is the seat of Auburn Theological Seminary, an institution of high rank, founded by the Presbyterian denomination. A statue honors the name of William H. Seward, a native of this place. In the nineteenth century discussion of prison management, the system in vogue in the Auburn penitentiary was frequently quoted as a type of the congregate as opposed to the solitary method of confinement.

Auction, a sale of property in public to the highest bidder. The sale may be conducted by written bids opened at a given time or by public outcry. An auctioneer is required usually to have a license. His compensation may be fixed at a certain percentage or by time. In either case, the goods sold may be held for his pay. If the goods are delivered to the auctioneer, especially at his place of business, he is responsible to the owner for their selling value; but not so if the goods are sold on the owner's premises and the owner acts as his own clerk. Burlesque and facetious commendation of goods is permitted to create good humor, but serious misstatements designed to mislead bidders void a sale. The auctioneer may decline to sell on a single bid; but if a second, however low, be accepted by announcement to the crowd, the article may not be withdrawn from sale. The auctioneer is responsible for the delivery of the goods to the successful bidder. In a town the display of a red flag announces that an auction is in progress. The public crier is also wont to pass along swinging his bell and calling "auction, auction." Country auctions are announced usually in local papers and by means of hand bills. In Scotland an auction is called a public roup. In selling an important property, as for instance, a large estate, the Scotch auctioneer sometimes resorts to the device of lighting an inch of candle. The highest bid made before the wick falls over and the flame dies out secures the property. There are from 20,000 to 30,000 auctioneers in the United States. There are about 5,000 city auction houses.

Audubon, John James (1780-1851), an American naturalist, a native of Louisiana. His parents were French. They sent him to Paris to study drawing. From childhood Audubon was given to hunting birds' nests and to keeping birds as pets. When he returned from Paris he took to an outdoor life. He spent years in what were, at that time, the wilderness-

es of the Mississippi Valley. He made his headquarters for a time at Henderson, Kentucky. He explored the forests and waterways of the West and South. Sometimes his tramp occupied several months. In 1826 he went to London and published a work called *The Birds of America.* It contained a description of over one thousand birds with reproductions of drawings colored by his own hand. A complete set of Audubon's Birds in good condition is now worth several hundred dollars. Audubon's memory is preserved by an organization of Audubon societies. Branch associations for the protection and study of birds have been organized in not less than forty states of the Union. See BIRD.

Audubon Society, an association for the protection of birds. The persistence with which many birds have been hunted for their plumage has alarmed American bird lovers. Local Audubon societies exist in nearly every state of the Union. *Forest and Stream* has done excellent service in arousing public interest. Under the presidency of William Dutcher, a national association of Audubon societies has been formed with a paying membership of 1,000 members. National aid has been enlisted. Under authority of law President Roosevelt set aside a number of tracts for bird preserves. Each reserve is in charge of a government warden. He receives but one dollar a year from the government, but the position clothes him with authority. The expense is defrayed by the Audubon Association. In these reservations it is an offense against the law to kill a bird, to take an egg, or even to gather a feather. The reserves are scattered widely. They include swamps, forests, mud islands, and oceanic rocks.

A national organization was started at a meeting held in Washington in 1902, and in 1905 the organization of the National Association of Audubon Societies for the Protection of Wild Birds and Animals, William Dutcher, president, T. Gilbert Pearson, secretary and financial agent, became a fact. Through the generous gift of Mr. Albert Willcox the undertaking had a sound financial basis (in 1905-06 more than $331,000). At the end of 1906 the association had an interest-bearing endowment fund of over $336,000, in addition to about $9,000 from other sources.

In 1910 the Audubon bill was enacted in New York State, forbidding the sale of feathers of native birds. Laws similar to this followed in about 12 other states. In 1915 there was an enrollment of 373,153 school children as Junior Audubon members, and these received instruction in bird lore. The association has a special corps of lecturers, who give instruction to teachers at summer schools.

A department of applied ornithology was begun in 1914. This is a special work designed to get people interested in attracting birds about their homes, and for the propagation of ducks and other game by those whose homes favored the work. Bulletins and lectures emphasizing these points are important features of the organization.

The National Association of Audubon Societies is now a strong combination, far-reaching in its results. Paid wardens are kept to protect sea birds and their nests, on the Atlantic as well as the Gulf coasts in the United States. Islands where sea birds breed are owned or leased. The societies originated the Federal bird reservations, and co-operate with the government financially for their protection. Over 6,000,000 pages of literature dealing with the protection of bird life are issued annually. Money is expended every year for the protection of big game, for the feeding of game birds and song birds in winter, and for the prosecution of those breaking the game laws. A large sum of money is collected each year to further the cause, and it is a point of pride with the association that but seven per cent of the income is expended for administrative salaries.

Following are the various national reserves: Duck Lake, off the coast of Maine; Stump Lake, in North Dakota; Huron Island, in Lake Huron; Pelican Island, in Indian River, Florida; Passage and Indian Keys, in the Tampa Bay; Breton Island, off the Louisiana coast; the Shell Key Reserve, off the Louisiana coast; Tern Island; Three Arch Rocks, off the coast of Oregon; the Key West Reservation, off the coast of

Florida; the Tortugas Keys Reservation, embracing the islands within the Dry Tortugas in the Gulf of Mexico, and 6 others recently organized. Among these are the Klamath Lake Reserve, the Matlacha Pass Reservation, in Florida; the Palma Sola, in Palma Sola Bay; the Pine Island Reservation, Florida; the Chase Lake Reservation, N. Dakota, and the Lake Malheur, in Oregon.

See BIRD.

Auerbach, ow'er-bäk, **Berthold** (1812-1882), a German novelist and poet. He was of Hebrew parentage and was born at Nordstetten, Würtemberg. He began writing while a student at Heidelberg, but won little attention until some years later, when he published *Village Tales of the Black Forest,* which made him famous. These stories have been translated into nearly all European languages. *On the Heights* is Auerbach's masterpiece. *Brigitta* is also a popular story.

Augean Stables, the stables of Augeas, king of Elis. Three thousand oxen had been kept here for thirty years. The cleansing of these stables formed one of the twelve labors of Hercules. It was performed by him in a single day. The words, "Augean Stables," have come to be used figuratively for an excessive accumulation of filth. The expression is also used to describe corrupt political conditions, implying that the remedy is almost beyond human power. See HERCULES.

Augsburg, a celebrated city of Bavaria. It takes its name from the old Roman colony established by Augustus about 14 B. C. In the Middle Ages Augsburg was a free, imperial city and the great center of traffic between Germany, Italy, and the Levant. The daughters of its merchants were considered fit wives for princes. The men of the Fugger family, in particular, raised themselves from the state of poor weavers to that of wealthy merchants, the Rothschilds of their age. They frequently replenished the exhausted treasury of Maximilian I and Charles V. Charles V held his famous Diets in this city. In 1530 the Protestant princes submitted the Augsburg Confession to the emperor for his approval. This was a reformed creed drawn up by Melanchthon. It is the present basis of the Lutheran faith.

On account of its buildings and historical associations, Augsburg is an exceedingly interesting old city. The tourist is interested in the cathedral with fine stained glass windows, and altar pieces by Holbein the Elder; in the city hall, on the gable of which is fixed a large pine cone of bronze, the heraldic emblem of the city; in the Maximilian Museum, with collections of coins, medals, wood carvings, smith work, and relics from lake dwellings; in the Fugger House, still the residence of a descendant of that family; and in a picture gallery in the old monastery of St. Catherine. The old walls of the city have been leveled to make room for fine boulevards. The present population is about 154,555. The city has a fine water power, utilized by means of a number of canals traversing the town. Citizens are engaged in a number of modern industries, including the manufacture of linen, cotton, woolen, and silk cloth, watches, jewelry, goldsmith work, scientific instruments, leather, chemicals, and type. The *Algemeine Zeitung,* or *Augsburg Gazette,* one of the most influential papers in Europe, is published here.

See NUREMBERG; WESTPHALIA, PEACE OF.

Augsburg Confession. See AUGSBURG.

August, the eighth month of the year. Beginning the year with March the Romans called August Sextilis, or the sixth month. Quintilis, or the fifth, was renamed July, in honor of Julius Caesar. The Roman senate renamed the sixth month, August, in honor of Caesar's successor, the Emperor Augustus. August had originally but thirty days; July had thirty-one; so an additional day was added to August in order that the month of Augustus might not seem inferior in any respect to the month named in honor of Julius Caesar. This is one reason why the months of the year are so unequal in length, it being impossible to give them all thirty-one days apiece. In the north temperate zone August is preëminently the month of harvest. It is a winter month in Tasmania.

Augusta, a beautiful city of Georgia at the headwaters of the Savannah River. It is regularly laid out with broad streets and many shade trees. Greene street, the most important residence street, is one hundred seventy feet wide and has a parkway with a double row of trees running through its center from end to end. The city operates the Augusta Canal, one of the largest in the country. From a dam in the river nine miles above the city, it furnishes water power for a dozen large cotton mills. Augusta is one of the largest cotton markets in the world. It has also manufactories of cotton goods, iron foundries, wood working establishments, and railroad shops. It has a fine hotel, the Bon Air, which is a favorite with winter tourists from the north. Augusta is the county seat of Richmond County. Its population in 1920 was 52,548.

Augusta, the capital city of the state of Maine. It is the county seat of Kennebec county, and is situated on both sides of the Kennebec River about sixty miles northeast of Portland. A dam above the city furnishes water power for cotton mills, pulp and paper mills, and for lumber manufactories. Augusta has one of the finest state houses in New England, built of white granite. It contains the state library of 60,000 volumes. The United States Arsenal is on the east side of the river and a National Soldiers' Home is just outside the city limits. Augusta's location among the hills and lakes of the Kennebec country has made it a popular summer resort. Its population in 1920 was 14,114.

Au'gustine, Saint (354-430), one of the most renowned fathers of the early Christian church. He was a native of Numidia, educated at Carthage and at Rome. In his youth he appears to have been rather a wild young pagan; but on his conversion to Christianity he became one of the pillars of the church. He rose to be bishop of Hippo, now Bona, a seaport of Algeria.

An order of monks, calling themselves hermits of St. Augustine, or Augustinians, formed in north Africa, has since spread to various parts of the world. Luther, it may be remembered, was a monk of St. Augustine. The Augustinians are well represented in Cuba, the Philippines, and in the United States. Augustine left a large body of writings in Latin. They are regarded with respect and have wide influence.

Longfellow acknowledges a suggestion in the following lines:

> Saint Augustine! well hast thou said,
> That of our vices we can frame
> A ladder, if we will but tread
> Beneath our feet each deed of shame.
> . . . . . .
> Nor deem the irrevocable Past,
> As wholly wasted, wholly vain,
> If, rising on its wrecks, at last
> To something nobler we attain.

Augus'tus (63 B. C.-14 A. D.), a title of honor given by the Romans to the emperor, Caius Octavius. He was a grandnephew of Julius Caesar, who trained him for public affairs and made him his heir. Upon the assassination of Caesar, Octavius inherited the influence of Caesar's party. With Mark Antony and Lepidus, he formed the famous Second Triumvirate, which resulted, as may be remembered, in the exclusion of Lepidus, the overthrow of Antony and his mistress, Cleopatra, and the final recognition of the leading spirit, Octavius, as the august master of the Roman world.

Next to Julius Caesar, Augustus may be considered the master military genius of Rome. He extended and confirmed the Roman power in every direction, subjugating outlying tribes and subduing revolts. The temple of Janus, the doors of which stood open in time of war, was closed twice during his reign, something unprecedented in the earlier history of Rome. During intervals of peace he did much to found colonies, to reform civil abuses at home, and to improve the appearance of Rome. Of the latter, it is said, "He found it of brick, but left it of marble."

Much as we may dislike many traits in the young man, it is only justice to say that in his mature years he established order, afforded security to various industries, built roads, drained marshes, established a postal system, ordered a census taken, and had the art, moreover, to sink

an early life of adroit, unscrupulous selfishness and partisan butchery in a later life of decorous unostentation in which the public good seemed his only desire. Under his rule the empire increased in wealth and population.

Among writers his reign is known as the Augustan Age. In Latin literature, it corresponds to the Elizabethan Age of England. The great writers of Rome, Virgil, Horace, Ovid, and Livy belong to this period. During the reign of Augustus, Christ the Lord was born in Bethlehem of Judea, and the wise men of the East came with their treasures to seek him.

See ANTONY; CLEOPATRA.

Auk, a member of the large group of diving birds. The auk is related to the murres, puffins, grebes, and loons. It is remarkable for the shortness of its wings, which it employs as fins or paddles for swimming under water. It is remarkable also for the position of the legs, which are placed so far backward that the bird walks with difficulty, and is obliged to maintain an upright attitude. It has a much compressed bill, so sharp along the ridge as to resemble the edge of a knife. The auks are sea-birds. They are wonderful divers. They catch fish, and gather shell fish at the bottom of the sea. They nest in colonies on islets or on the rocky shores of the northern part of the northern hemisphere. Auks lay but one egg in a season. There is no attempt at nest building. The female holds the egg above her webbed feet between the thighs.

There are several species of auks. The razor-billed auk is the largest existing species. It is about seventeen inches long, blackish above, with a large white spot before the eye. The sides of the neck and throat are seal brown; belly, white. It is very common on the coasts of Britain. Its eggs are considered a delicacy. On the coast of Labrador the birds are killed for their feathers; and in some places their flesh is used for food. It is a fierce bird, and, if seized, will hold on to the hand with its bill until it is killed.

The auk of which most has been written is the great auk. This bird was shaped somewhat like a loon, with black upper parts; sides of the upper parts and throat silvery brown; under parts silvery white. Length, thirty inches—the size of a goose. It was unable to fly. Its wings were shaped for diving flippers. It lived on fish, and ranged from Massachusetts and Ireland along the coasts and islands to the Arctic Circle. Its annual migrations were made wholly by swimming. It was hunted so zealously for oil, flesh, and feathers that, in spite of enormous numbers, no living auk has been seen since 1842. Some seventy specimens and a number of eggs have been preserved in museums. An egg is reported to have brought $1,000 in 1906 at a London auction. Four auks frequent our Pacific Coast. One, the least auklet, has the "bulk of a small, thinly-feathered screech owl."

Auld Lang Syne, a Scotch song. It was composed by Robert Burns about 1789. Auld Lang Syne is sung oftener than any other of Burns' songs. It is claimed, indeed, that it is sung oftener than any other song in the world. Its popularity seems to be increasing. As to the sources of the poem, Burns stated in his notes that he had written the song from hearing an old man sing it. Mr. Manson suggests that "the general opinion is that the poet was romancing. At least, if he recast some old song he handled it so as to make it his own, and to confer immortality upon it." Mr. W. E. Henley, the very intelligent and appreciative editor of the Centenary edition of Burns, has dug up an old song or two, familiar, no doubt, to Burns, from which he selects the following lines and refrain:

> Should auld acquaintance be forgot,
> An' never thocht upon?
> On old long syne, my jo,
> On old long syne,
> That thou canst never once reflect
> On old long syne.

Mr. Henley adds, "And, after all, however poignant the regret, and however wide-eyed and resentful the amazement of those who esteem a man's work on the same terms as they would a spider's, and value it in proportion as it does, or does not, come out of his own belly, enough remains to Burns to keep him easily first in the first flight of singers in the vernacular,

AURORA BOREALIS

1. Streamers, a common form in north temperate latitudes.
2. Draperies, a type often observed in Greenland.

and to secure him, outside the vernacular, the fame of an unique artist. I have said that, as I believe, his genius was at once imitative and emulous; and, so far as the vernacular song is concerned, to turn the pages of our third volume is to see that, speaking broadly, his function was not origination but treatment, and that in treatment it is that the finer qualities of his endowment are best expressed and displayed. His measures are high-handed enough; but they are mostly justified. He never boggles at appropriation."

We make room for the song entire. The version is that of Mr. Manson:

AULD LANG SYNE.

Should auld acquaintance be forgot
And never brought to min'?
Should auld acquaintance be forgot,
And auld lang syne?

Chorus.

For auld lang syne, my dear,
For auld lang syne.
We'll tak a cup o' kindness yet,
For auld lang syne.

We twa hae run about the braes,
And pou'd the gowans fine;
But we've wander'd mony a weary fitt
Sin' auld lang syne.

We twa hae paid'lt i' the burn
Fra mornin sun till dine;
But seas between us braid hae roar'd
Sin' auld lang syne.

And here's a hand, my trusty fier,
And gie's a haud o' thine;
And we'll tak a right guid-willie waught,
For auld lang syne.

And surely ye'll be your pint-stowp,
And surely I'll be mine;
And we'll tak a cup o' kindness yet,
For auld lang syne.

Auld Licht Idylls, a collection of short stories, by James Matthew Barrie, depicting Scottish village life. See BARRIE.

Aurochs, ä′rŏks, the wild ox of Europe. It was once abundant in the forests of Europe, but has been hunted until only a few herds, under protection, are now left in Lithuania and in the Caucasus Mountains. It resembles the American bison or "buffalo" closely, but is a trifle larger and less shaggy. The fore and hind quarters of the aurochs are also unequal. See BISON.

Aurora, a prosperous city of Kane County, Illinois, situated on the Fox River, about forty miles from Chicago. Aurora is important as a manufacturing center. Among its numerous products are cotton goods, corsets, silverware, flour, sash and blinds, stoves, carriages, and machinery. It is on several railroads, the Chicago, Burlington & Quincy having extensive railroad shops in the city. The public schools of Aurora are exceptionally good. The Jennings Seminary is located here, and there are many churches, a Carnegie library, and a fine city hall. The population in 1920 was 36,397.

Aurora, ä-rō′ra, in Roman mythology, the goddess of the dawn. She was called Eos by the Greeks. The poets of both nations were wont to describe her as rising from the ocean in a chariot, "with rosy fingers dropping gentle dew," in fanciful allusion to the rosy skies just before sunrise. From personifying the dawn of day, the word Aurora has come to be used as synonymous with rise or beginning. There are many allusions to Aurora among English poets. See GUIDO RENI.

Aurora, now, fair daughter of the dawn,
Sprinkled with rosy light the dewy lawn.
—Pope.

I care not Fortune what you me deny:
You cannot rob me of free Nature's grace,
You cannot shut the windows of the day
Through which Aurora shows her brightening face.
—Thomson.

Now to Aurora, borne by dappled steeds,
The sacred gate of orient pearl and gold
Expanded slow to strains of harmony.
—Landor.

Aurora Borealis, the Northern Lights. Frequently after nightfall, a dark band may be seen in the northern sky, surrounded by an outer arc of streaming light. The farther the observer advances into the polar regions, and the colder the winter, the more brilliant this light becomes. Travelers tell us that these northern lights do much to dispel the darkness of the long arctic night. They are brighter even than moonlight. Hunters can see to pursue the seal and walrus; dog trains travel with security; at times ordinary print can be read without difficulty. The region of greatest intensity does not appear, however, to be at the north pole but to be a zone crossing the northern

land masses, following closely the zone of greatest cold described elsewhere under ARCTIC REGIONS. Scientists have settled down to the conclusion that the aurora is an electrical light and that, though it streams far up into the heavens, seemingly filling space, it is in reality entirely within the earth's atmosphere. A corresponding phenomenon in antarctic regions is called the Aurora Australis, or Southern Lights.

Auro'ra Leigh, lē, the heroine of a narrative poem of the same name by Mrs. Browning. See BROWNING, ELIZABETH BARRETT.

Aurungzebe, a-rŭng-zeb', emperor of Hindustan. He was the third son of the emperor Shah Jehan. His reign began in 1658, after he had murdered two brothers and imprisoned his father. He was surnamed "Conqueror of the World." Musselmans regard him as one of the greatest of their monarchs. He built a magnificent mosque in Benares. It is still the most prominent object in that sacred city.

Austen, Jane (1775-1817), an English novelist. Her father was a rector who gave his daughter the best education at his command. Her novels read now seem to make much of little and to be the product of an amiable, refined, commonplace mind. The chief are *Sense and Sensibility, Pride and Prejudice, Mansfield Park,* and *Emma.* Miss Austen was buried at Winchester. Walter Scott was pleased to say of her work: "That young lady had a talent for describing the involvements, feelings, and characters of ordinary life which is to me the most wonderful I have ever met with. The big bow-wow I can do myself like anyone going; but the exquisite touch, which renders commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me."

Austerlitz, a small town of Moravia. It lies about a hundred miles north of Vienna. The village has a population of about 3,500 people. There is pride in a palace belonging to a local prince, and in a beautiful church. Austerlitz is memorable for a battle fought here December 2, 1805. A French army of 60,000 men led by Soult, Murat, and Bernadotte completely defeated 80,000 Russians and Austrians under the command of Kutusoff. The French lost about 12,000 men; the allies over 30,000. The slaughter was heightened by the unexpected assault of Napoleon's reserves upon the Austrians as they were fleeing from the battlefield. This part of the battle deserves the name of massacre. The battle of Austerlitz is called sometimes the Battle of the Three Emperors. Three emperors, Napoleon, Francis, and Alexander I, were present. This battle is memorable as bringing to an end the ancient Holy Roman Empire which had existed since 962, the Hapsburgs thereafter being known as emperors of Austria. Napoleon's power reached its zenith at this time.

Austin, Alfred (1835-1913), an English poet, critic, and journalist, poet laureate of England. He was born at Headingly, near Leeds. He was educated at the University of London and called to the bar in 1857. For ten years he was editor of the *National Review.* He was made poet laureate on the death of Tennyson in 1896. Mr. Austin is the author of novels, political works, and many volumes of poems. Among them may be mentioned, *The Season, a Satire, The Human Tragedy, Savonarola.* In prose and verse are *The Garden that I Love, In Lamia's Winter Quarters,* and *Haunts of Ancient Peace.* Austin severely criticised the poetry of his own period, calling it "feminine, narrow, domesticated, timorous." He demanded the movement and passion of former eras, and yet his own poetry lacks decidedly both movement and passion. There is some diversity of opinion in regard to his verse, but it is conceded generally that his shorter poems are more acceptable than his pretentious efforts.

The author's satirical interludes have point, and I have seen graceful lyrics from his pen; but his ambitious verse, on whatever principle composed, is not of the class that reaches the popular heart, nor likely, on the other hand, to capture a select group of votaries like those so loyal from the outset to Rossetti and Browning. —Stedman.

Austin, Stephen Fuller (1792-1836), a Texan pioneer. From his father, Moses

Austin of Connecticut, he inherited a grant from the Mexican government for the settlement of 300 American families somewhere in Texas. This colony Stephen located at what is now the city of Austin, the present capital of the state. When this and other American colonies had received a considerable number of settlers, they met in convention, and sent Austin to Mexico to request permission for the formation of a Mexican state, to be known as Texas. The evasive answer of the Mexican government, Santa Anna's invasion of the country, the siege of the Alamo, and Texan independence are all a part of the history of the Southwest. Austin did much for the new state and may be regarded justly as one of the American founders of empire. See TEXAS; ALAMO.

Australasia, an arbitrary term used to name a division of the globe. Geographers include usually under this name Australia, Tasmania, New Zealand and the Fiji Islands. By others it is made to include parts of Polynesia and the Malay Archipelago. The same group of islands is designated sometimes by the term Melanesia, which means "black islands," the natives belonging for the most part to the black race. The word "Australasia" means "South Asia."

Australia, a continent situated southeast of Asia between the Indian and the Pacific Oceans. The name is derived from the Latin *australis,* meaning southern. The continent may be compared in shape to a geranium leaf, with the Great Australian Bight occupying the southern shore or base of the leaf, and the Gulf of Carpentaria extending into the northern shore or tip for a distance of 1,000 miles. The greatest east and west line of Australia is 2,400 miles; the greatest north and south line is 1,970 miles. If the map of Australia were placed on that of North America, the extremities of these lines would fall in the vicinity of New York and San Francisco, and Galveston and Winnipeg respectively. The area of Australia, including as it does the island of Tasmania, is 2,974,581 square miles. The coast is regular with few indentations. Its entire extent is 8,000 miles. A coral reef, known as the Great Barrier reef, follows the northeastern coast for about 1,000 miles. It is separated from the continent by a channel from ten to thirty miles wide. Darwin considered that the coast has subsided gradually, and that the coral insects have simply kept their fringe of reef built up to the level of the surface, but this theory has been abandoned.

TOPOGRAPHY. A fringe of broken plateaus and low mountain ranges curves around three sides of the continent not unlike a wide horseshoe, with the two ends at the eastern and western extremities of the Bight. The immediate coast varies from low plains to abrupt cliffs. The highest mountains are in the southeast. Three peaks rise to an altitude of over 7,000 feet, slightly exceeding the White Mountains of New Hampshire. The region represented by the horseshoe is for the most part well watered, and a tract immediately within, shaped like the crescent of a new moon, is fairly fortunate in this respect; but a large interior region corresponding to the frog of the horse's foot, and occupying from one-third to one-half of the continent, is subject to drouth. This dry region reaches the southern shore, where, for 1,000 miles of seacoast, not even a rivulet empties its waters into the Great Bight. This vast interior region is broken up by ridges into various basins, the lowest parts of which are occupied by saline mud lakes, baked and arid, cracked at times, and flooded with water at others. The annual rainfall varies from fifty inches or more on some parts of the coast to almost none at all in some parts of the interior. The variation in plant and animal life is no less marked.

PLANTS. Geologically, Australia is an old continent. The rocks are old. In the opinion of scientists, the forms of plants and animals are old. The continent has been shut off by itself for ages. For some reason, its animals and plants have not developed. The trees are peculiar, nearly all hold their leaves the year around. There are 300 kinds of acacia trees. Peculiar sorts of oak, gum tree, cedar, and

pine are found. The baobab and the eucalyptus are characteristic. One or two species of the latter rival the gigantic sequoias of California in size. One felled near Melbourne measured six feet in diameter at a distance of 300 feet from the ground. It is stated that certain native lilies, tulips, and honeysuckles grow to be trees. Portions of the coast, particularly on the north, are clothed with tropical jungles, and a part of the interior is occupied by bush through which the traveler is obliged to chop his way. The bush contains so many gum-bearing trees that it is said to be delightfully fragrant, even more so than our pine forests. A mere list of the interesting plants found in so vast and varied a region would be wearisome. There are over 10,000 flowering species, including figs, mallows, nightshades, spurges, milkweeds, grapevines, madders, mints, orchids, mistletoes, palms, and sedges. The lotus and water lilies,—red, purple, blue, and white,—adorn the rivers and bayous. The variation in vegetation found along a line extending from Florida to Arizona is not greater than may be seen in following a similar line drawn from a coast jungle over a coast range and across a grassy plain into a desert region of interior Australia.

Animals. The native animals are even more peculiar than the plants. There are four species of large, fruit-eating bats, called flying foxes, twenty insect-eating bats, a score or so of land-rats, and half a dozen water-rats. All these, with the numerous fishes, seals, a horde of insects, and several game birds, such as the quail, plover, duck, goose, and pigeon, are not particularly different from the animals of other regions. In addition to these, however, there are the duckbill and the spiny anteater that produce their young from eggs housed in a burrow, and 110 species of pouched animals utterly unknown elsewhere, if we except one American animal, the opossum. Of these peculiar Australian animals, the females are provided with a fold of skin or pouch within which the young may nestle and nurse in safety. These pouched animals are divided into five classes according to their food, as root-eaters, grass-eaters, fruit-eaters, insect-eaters, and flesh-eaters. They vary greatly in size from the giant kangaroo that weighs over 200 pounds to the active little flying fruit-eater, smaller than a mouse.

There are several hundred Australian birds, including many peculiar species, such as the emu, related to the ostrich; the lyre bird, with its tail feathers spread in the shape of a lyre; the black swan contradictory of the adage; the brush turkeys, the mound-birds; and the bower birds. Turtles, a crocodile thirty feet long, numerous lizards up to eight feet in length, forty frogs, one with blue legs and a golden back, and many large, harmless pythons may be found, especially in north Australia; for being south of the equator, the tropical plants and animals are to be sought on the northern shore.

The ordinary domestic animals have been introduced, as well as the sparrow and the rabbit. The latter has proved to be a pest in the southeast. New South Wales has built 17,000 miles of rabbit proof fence in an endeavor to exclude the pest from farming districts. Camels have been introduced for use as pack animals in the interior.

Native Population. The native Australians are considered a branch of the black race, but they differ from those of Africa. Their complexion is not so black; the hair is described as shaggy or curly, not woolly; the nose is more like that of a European; the lips are thick, but do not turn outward; the legs and arms are as deficient in muscle, but the heel is shorter. They have no cattle or fields. They have no houses other than huts that may be built in an hour. The families wander from place to place and, save as employed by whites, live by hunting and fishing. They are proficient in the taking of game with the boomerang, and in throwing the javelin. This they sometimes launch by laying it on a piece of board, and flinging it with the motion employed in casting a potato from the end of a rod. They are a degraded lot and are diminishing in number Perhaps 60,000 are left.

Early History. Australia was a mythical country not unlike Atlantis 200

1-2. Tonga clubs. 3-4. Clubs from the Marquesas Islands. 5. Shell ornament from the Solomon Islands. 6. Lance with obsidian point. 7. Lance point from the Admiralty Islands. 8. Club from Moresby Island. 9. Jade battle-ax from New Caledonia. 10. Carved shield from New Guinea.

HANDIWORK OF OCEANIC TRIBES.

B. C. It was not until Captain Cook made his famous voyage of exploration in 1770, and took possession in the name of Great Britain, that much was known of the region among English speaking people. In 1788 the British government inaugurated the policy of planting colonies of people convicted of crime. About 70,000 convicts were deported to Australia and nearly as many more to Tasmania. The practice did not cease until 1868. In the meantime the convicts were followed by their families and friends, others were attracted by the fertility and opportunities of the country and immigration set in. About the year 1813 pioneers discovered passes leading through the Blue Mountains to the grassy uplands, and began to engage in sheep and cattle raising.

MINERALS. A discovery of gold in 1851 created excitement and was followed by an influx of goldseekers to be compared with the stirring days of California. The "Welcome" nugget found at Ballarat weighed 2,217 ounces, and was sold for $52,500. Gold was found in many parts of the continent.

The value of the gold produced in 1919 was approximately $27,000,000. Gold production is decreasing, while silver and copper production shows a slow increase. But there is no change in the production of tin.

CLIMATE. The Australian summer is excessively hot, as it comes at the time when the earth is nearest the sun. The North American summer, on the contrary, comes when the earth is farthest away from the sun. The difference is noticeable. Being in the southern hemisphere, the Australian spring comes at the time of our fall and their fall comes at the time of our spring.

PRODUCTS. The agricultural possibilities of Australia are very great. A large part of the interior has proved adapted to sheep raising. Three hundred million pounds of wool are sent to Great Britain annually. Hides, horns, bone-dust, frozen, preserved, and salted meats, and tallow are produced in large quantities for export. The forests yield fine sandalwood, cedar, pine, and hard woods valuable for cabinet work and for building. The pearl-shell, dugong, oyster, and turtle fisheries employ a large number of people and yield a handsome income. The agricultural products are as varied as they are in the United States. Sugar, rum, Indian corn, wheat, rice, sorghum, guinea-grass, grapes, arrowroot, bananas, sweet potatoes, tobacco, apples, peaches, plums, almonds, olives, coffee, cotton, pineapples, potatoes, and hops are the more important.

One of the difficulties in understanding so vast a territory lies in its very extent and variety of climate. Two plants, animals, or productions named above in succession, may, as a matter of fact, belong to districts a thousand miles apart. As late as 1860 the government offered a bonus of $50,000 to any one who would force his way from the south coast to the north coast and return again with authentic information about the interior.

Australia, The Commonwealth of, a member of the British Empire. The commonwealth comprises six former colonies—New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania. The union was proclaimed at Sydney, January 1, 1901. The six colonies named are now known as the "Original States." Melbourne is the temporary seat of the Federal government, but in 1910 a site for the federal capital was fixed upon at Canberra, in a district situated in New South Wales, containing over 1,000 square miles. A railway connects Canberra with Jervis Bay, which is also held by the federal government.

The form of government is not essentially different from that of the United States, but it corresponds even more closely to the government of the Dominion of Canada. Legislative authority is vested in a governor-general, a senate, and a house of representatives. The governor-general is appointed by the crown, that is to say, by the king of the United Kingdom. The commonwealth Senate consists of six senators for each of the Original States, chosen for six years. The House of Representatives is composed as nearly as may be of twice as many members as there are senators, the several states choosing represent-

atives in proportion to their population. The House continues in office for three years, unless sooner dismissed. The commonwealth has jurisdiction over railways, shipping, commerce, lighthouses, finance, defense, postal and telegraph service, marriage and divorce, emigration and immigration, weights and measures, census, and statistics. Earl Dudley is the present governor-general.

Each of the Original States has a local legislature, consisting of a senate or a legislative council, and a house of representatives. The members of the legislative council of New South Wales and that of Queensland are appointed by the crown for life; otherwise state senators and state representatives are elected.

Although nominally subject to the British Empire, the Commonwealth of Australia is both independent and radical. To begin with, the colonists insisted on the term *Commonwealth,* as representing a greater degree of independence than either *Dominion* or *Colony.*

The Invalid and Old Age Pension Act passed in 1908 grants pensions to persons who are not less than sixty-five years of age, and who have lived in Australia at least twenty-five years. The grant must not exceed $125 a year. The pensioner's whole income, including the pension, must not exceed twice that sum. Invalids' pensions are granted to persons who become incapacitated after supporting themselves respectably for not less than five years. Women have the same right to vote as men. The Australian ballot system, whereby every voter retires into a booth and marks his ballot in private, has already been adopted by a number of the United States. The Torrens Land System, whereby the government attends to the sale of real estate and thereby is enabled to guarantee title, is another Australian device. The telegraph and telephone lines are owned by the commonwealth. Railroads are numerous in the more thickly settled portions of the country. Over nine-tenths of the railroads are owned by the commonwealth. Several thousand miles of railway line are of narrow gauge.

Australia trades chiefly with the mother country. Adelaide, Melbourne, Sydney, and Brisbane are the chief cities of export. The products of the mine, the stock ranch, the farm, the orchard, and the jungle are sent abroad and exchanged for apparel, cloth, books, chemicals, and machinery.

Australia is preëminently a country of intelligence, of opportunity, and of a future. Postal facilities, free schools, independent churches, and general thrift are characteristics of the commonwealth. The municipalities follow the example of the commonwealth, or rather the commonwealth has followed the example of the municipalities, in acquiring or establishing public utilities. The Australians intend to have no corporations taking an undue part in politics. Municipal ownership of public utilities is usually a wise measure.

As a result of the World War, Australia was given by the League of Nations a mandate to administer all the islands in the Pacific south of the equator that formerly belonged to Germany, with the exception of the Samoa group—alloted to New Zealand. Of these islands, the most important, formerly known as the Bismarck Archipelago, is now called New Britain Archipelago. The mandate includes the former German possessions in New Guinea.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land, area, square miles	2,974,581
Forest area, acres	92,500,000
Population (1921)	5,436,794
Aborgines	60,000
Chief Cities:	
Sydney	897,640
Melbourne	784,000
Adelaide	255,318
Brisbane	209,699
Perth	155,129
Hobart	50,000
Number of states	8
Members of state senate	36
Members House of Representatives	75
Salary of Governor-General	$45,000
Bonded indebtedness	$1,807,740,112
National revenue	$173,473,061
Farm area, acres	19,346,925
Improved land, acres	16,651,974
Wheat, bushels	45,970,000
Oats, bushels	12,559,000
Corn, bushels	6,764,000

Barley, bushels	4,288,000
Hay, tons	2,989,000
Sugar cane, tons	1,350,000
Potatoes, tons	294,000
Sugar beets, tons	13,000
Grapes, tons	139,000
Butter, pounds	165,648,791
Wine, gallons	7,649,000
Wool, pounds	663,249,000
Domestic Animals:	
Horses	2,421,000
Cattle	12,711,000
Sheep	75,554,000
Swine	696,000
Total exports	$660,145,000
Total imports	$816,665,000
Gold mined, ounces	943,190
Lead and silver, value	$30,000,000
Copper, value	$5,000,000
Tin, value	$5,000,000
Coal, value	$30,000,000
Skins and hides exported, value	$15,000,000
Beef exported, value	$15,000,000
Miles of railway	23,295
Teachers in public schools	24,177
Pupils enrolled	764,980

Australian Ballot System. See AUSTRALIA; BALLOT.

Austria, a small country of central Europe, which, before the World War, constituted the western part of the Dual Monarchy, Austria-Hungary. The present Austria, with an area of 30,716 square miles, is a constitutional republic, proclaimed on November 12, 1918. The boundaries were determined by the Treaty of St. Germain, September 10, 1920, and the constitution was adopted in October of the same year. Austria is bounded by Germany, Jugo Slavia, Czechoslovakia Italy and Switzerland, and includes territory corresponding roughly to the former provinces of Upper and Lower Austria, Northern Tyrol, Salzburg, Styria, Carinthia and Vorarlberg. In 1920, the population of Austria was 6,139,197.

TOPOGRAPHY. After Switzerland, Austria is the most mountainous European country, being traversed by ranges of the Eastern Alps. The highest peaks are in the old Tyrol, where the scenery is as bold as is that of Switzerland. The principal waterway of Austria is the Danube, flowing across the country from west to east, and navigable throughout. Other important rivers are the Waag, March, Mur, Inn and Enns. In the mountains are numerous beautiful lakes, large and small.

INDUSTRY. Austria is rich in natural resources, possessing deposits of iron and coal, an abundance of agricultural land and mountain pastures, and extensive forests of valuable timber. About forty per cent of the working population of Austria is engaged in husbandry and forestry. The farms are for the most part small, but are intensively cultivated. The live stock and dairying indutsries are also important.

Mining contributes greatly to the country's wealth. Anthracite and soft coal, and iron ore are the principal minerals, while lead and silver, gold, zinc, copper and salt are found in smaller quantities.

Manufacturing is largely confined to the production of iron and steel, textiles, paper, jewelry, musical instruments, silk, automobiles, lumber, brewery and distillery products, flour, shoes and tobacco products.

EDUCATION. Elementary education is free, and compulsory between the ages of six to fourteen years, and in 1919 was provided by 4,102 schools. Secondary education is also well provided for; there were, in 1919, 37 normal schools; lower and higher schools of forestry and agriculture, besides numerous schools of technology, commerce and art. Austria has three universities—Vienna, Graz and Innsbruck, to each of which are attached several technical colleges.

HISTORY. The former territory of Austria was first known in history as parts of various Roman provinces. In 791 Charlemagne made it the eastern part of his empire. The name, indeed, is derived from the German *Oester Reich*, or eastern empire. Under the rule of a famous family called the House of Hapsburg, which came to the throne in 1282, Austria became the first power in Europe, and may be so regarded until it was deposed by Napoleon. The house of Austria had sufficient influence to control the election of the old German, or Holy Roman, emperors for several centuries. By marriage and otherwise, Spain, Austria, and the Netherlands were brought, for a time, under one crowned head. Emperor Charles V. inherited nearly the half of Europe. After Napoleon's day Austria became the leading power in a new German confederacy; but

it was opposed at every turn, and was finally excluded by Prussia after the Seven Weeks' War of 1866. At the height of her power Austria was a source of fear to all her neighbors, but at one time or other she lost a large amount of territory, formerly held in Saxony, Bavaria, Switzerland and Italy.

When, in the fall of 1918, the imminence of the break-up of the old Dual Monarchy was felt by all, the Germans of Austria announced their right to self-determination. Radical elements in the government and among the populace carried on a powerful agitation for an independent Austria. Efforts to avoid this end were futile. The present Republic of Austria proclaimed independence from Old Austria in October, 1918. On November 11, 1918, Emperor Charles abdicated, and on the following day the Republic was formally declared. A constitutional assembly was elected and the new constitution drafted.

Social and economic shocks followed the separation; shifting political winds rocked the country to and fro. In town and country incompetent but well-intentioned party organizations interfered in administration. Soviet republics were set up, at Budapest, in March, and at Munich, in April. Famine and misery added to the confusion, until at last Austria's plight became so pitiable that neutral and former enemy countries extended all possible assistance—especially economic—to save the country from absolute chaos. Union with Germany cannot be effected without the consent of the League of Nations. Austria's currency steadily depreciated, and complete economic ruin still faces the country. Several nations have renounced their liens upon the unfortunate Republic, but even so, her fate is still doubtful. Political stability and unstinting economic assistance are all that can save her.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	30,716
Population (1920)	6,139,197
Chief cities:	
Vienna	1,841,326
Graz	157,644
Linz	94,072
Innsbruck	55,650
Salzburg	36,749
Number of provinces	8
Members of federal council	46
Members of national council	175
State revenue	$18,665,000,000
Bonded indebtedness	$23,338,600,000
Farm area, acres	4,088,196
Wheat, bushels	6,452,000
Rye, bushels	12,661,000
Barley, bushels	4,160,000
Oats, bushels	12,016,000
Hops, pounds	90,000
Sugar beets, short tons	15,432
Beans, bushels	85,000
Domestic Animals:	
Horses	243,000
Cattle	1,505,000
Oxen	214,000
Sheep	2,000,000
Swine	6,000,000
Output of raw silk, pounds	165,000
Output of lignite, tons	2,408,865
Output of anthracite, tons	132,864
Output of iron ore, tons	465,032
Output of pig iron	100,035
Imports, tons	6,666,071
Exports, tons	1,449,300
Miles of railway	3,940
Teachers in public schools	30,667
Pupils enrolled	914,258

Austria-Hungary, often called the Dual Monarchy, was, before the World War, a country of central Europe—the largest European country after Russia. It had an aera of 261,242 square miles, and a population, in 1910, of 51,390,233. The states of Austria and Hungary were independent of each other, each having its own constitution, administration and parliament, the bond of union being a common ruler—a member of the House of Hapsburg, who bore the titles of King of Hungary and Emperor of Austria.

The organization of the army in a general way corresponded to that of Germany, but it was peculiar, in that Hungary maintained an army, Austria maintained an army, and Austria-Hungary maintained a third army. Every young man was required to perform two or three years of active military service away from home, and, in addition, report for drills and such other duties as were required long enough to bring his entire service up to twelve years. The great amount of military service required of the young men was one reason for emigration. The Austria-Hungarian army numbered about 350,000 men.

By an agreement between these two states concluded in 1867 and renewed every ten years, affairs common to the two states and administered by common ministries were: Foreign affairs, military and naval affairs; and finance. The Dual Monarchy collapsed at the close of the World War.

See AUSTRIA; HUNGARY.

Austrian Succession. *See* MARIA THERESA.

Autocrat of the Breakfast Table, The, a series of papers by Oliver Wendell Holmes. They were published in *The Atlantic Monthly* in 1857-58, appearing immediately afterward in book form. Twenty-five years before, Dr. Holmes had contributed two papers under the title of *The Autocrat of the Breakfast Table* to *The New England Magazine,* a short-lived Boston publication. He now decided to "shake the same bough again, and see if the ripe fruit were better or worse than the early windfalls." Until the appearance of these papers, Dr. Holmes was known chiefly as a medical lecturer, a local wit, and writer of verse. The Autocrat, as he is frequently called, now became famous. Holmes himself declared that Lowell, in demanding a contribution for the *Atlantic,* awoke him "from a kind of literary lethargy in which he was half slumbering." In form *The Autocrat of the Breakfast Table* somewhat resembles *The Spectator* of Addison and Steele. It has the flavor of conversation, but is largely a monologue—the talk of a thoughtful and learned man enlivened with bright fancy and keen humor. A few quotations will give a hint of pleasing qualities:

As to clever people's hating each other, I think a little extra talent does sometimes make people jealous.

Talk about conceit as much as you like, it is to human character what salt is to the ocean; it keeps it sweet, and renders it endurable. . . . When one has had all his conceit taken out of him, when he has lost all his illusions, his feathers will soon soak through, and he will fly no more. [But] it does not follow that I wish to be pickled in brine because I like a salt-water plunge at Nahant.

Do I think that the particular form of lying often seen in newspapers, under the title, *From our Foreign Correspondent,* does any harm?—Why, no,—I don't know that it does. I suppose it doesn't really deceive people any more than the *Arabian Nights* or *Gulliver's Travels* do. Sometimes the writers compile too carelessly, though, and mix up facts out of geographies, and stories out of the penny papers so as to mislead those who are desirous of information.

You never need think you can turn over any old falsehood without a terrible squirming and scattering of the horrid little population that dwells under it.

Boston State House is the hub of the Solar System. You couldn't pry that out of a Boston man if you had the tire of all creation straightened out for a crowbar.

Put not your trust in money, but put your money in trust.

Passion never laughs. The wit knows that his place is at the tail of the procession.

Every person's feelings have a front door and a side door by which they may be entered. . . . Be very careful to whom you trust one of the keys of the side door.

The brain-women never interest us like the heart-women: white roses please less than red.

There are few books that leave more distinctly the impression of a mind teeming with riches of many kinds. . . . *The Autocrat,* without being a profound book, may be a very profitable one. They greatly err who find in it only the crackling of thorns under a pot; the thorns are there and they crackle, but there is also something in the pot.—Bronson, *American Literature.*

See HOLMES.

Automaton, a contrivance that imitates the actions of a person or animal. The most familiar automaton is perhaps the cuckoo clock. The celebrated clock in the Cathedral of Strasburg has several automatic features, such as the apostles bowing at the feet of Christ, etc. In 1738 a Frenchman made a figure that played a piece of music on a flageolet. Other similar contrivances have been made.

Automobile, au-tō-mō′bĭl, a road vehicle carrying its own motive power. It is a nineteenth century realization of the prophecy made by the ingenious medieval monk, Roger Bacon, "We will be able to propel carriages with incredible speed without the assistance of any animal." The theory of the automobile was known to Solomon de Coste of Normandy in 1641. He wrote a book on the propulsion of carriages by steam power, and was cast into a Paris madhouse for it by Cardinal Richlieu.

AUTOMOBILE

The history of transportation is filled with examples of man's devotion to the idea of a self-propelled vehicle, from the days when Homer wrote of Vulcan making the "twenty-wheeled tripods" that, s p i r i t moved, would obey the beck of the gods. The motorist who today rides smoothly and silently in a high-powered automobile, or "motor car," along highways especially prepared for his convenience, enjoys the fruit of a long series of inventions. In Holland, as early as 1600, a road carriage with sails, propelled by the wind, made a trial run along the coast with 28 people on board; and mechanical propulsion was first proposed by Sir Isaac Newton in 1680, in the form of a steam carriage to be moved by the reactive effect of a jet of steam issuing from a nozzle at the rear of the vehicle. In the eighteenth century many experiments were made with steam, and Cugnot, a French engineer, produced in 1770 a steam road carriage that is still in existence. This was followed by a notable period of steam-coach construction in England, which lasted until about 1836, when it ended through the opposition of farmers and stage-coach drivers, who claimed that the steam vehicles frightened their horses.

This opposition, no doubt, set back the development of the steam automobile for fifty years. In 1870 a clockwork omnibus was constructed and tried in New Orleans; but it was not until the high-speed gas engine, operated on the principle of the Otto cycle, was produced in 1884 by Gustave Daimler, a German engineer, that the modern period of motor-car development began. Carl Benz, about the same time, built a gas engine to be applied to a three-wheeled motor carriage, and by the year 1894 there were a number of carriages in Europe and America which could be driven at speeds of 10 to 15 miles an hour. In the meantime M. Serpollet had invented his water-tube boiler for propulsion of carriages by steam, and made a successful test on the road in 1894. Electric vehicles also began to appear about the same time on both sides of the Atlantic, and the word "automobile," at first disliked, began to come into popular use, at least in America. The British prefer the word "motor car," or, for short, "motor." The term is applied to pleasure vehicles only, the usual name for commercial or freight vehicles being "motor truck" or "lorry" in England, and "camion" in France.

Modern automobiles are grouped in three classes, according to the motive power used. These are (1) vehicles propelled by internal combustion engines, using gasoline or some other petroleum product as fuel; (2) electric vehicles, propelled by electric motors supplied with current from storage batteries; and (3) steam vehicles, driven by an engine supplied with steam from a convenient form of boiler heated by oil or compressed fuel. There are several makes of successful steam vehicles in use in America, while electric vehicles are largely used by city folk but have a limited range of operation, due to the necessity for periodic recharging of the batteries. The machine mostly used is the gasoline automobile, which has done much to raise the standards of living in this and other countries and is now an almost indispensable adjunct of farm as well as urban life. A small gasoline automobile, which is manufactured literally by the million, is now within the reach of almost every American family; and there are other makes to suit all lengths of pocketbook.

The first automobile race in America was held under the auspices of the Chicago Times-Herald on Thanksgiving Day, 1895, and was won by Charles Duryea, a pioneer in American automobiling. His vehicle was of the buggy type, with high wheels, equipped with single-tube pneumatic tires, the first use of air tires in auto service in America. The motor was a two-cylinder four-cycle engine of about 4¼ inch bore and 4½ inch stroke. Many features found in present day automobiles were embodied in this Duryea vehicle, which is preserved in the Smithsonian Institute, Washington. It had the fixed front axle with steering knuckles at the ends, the center lines of which were inclined outwardly at the bottom so as to point to the ground at the point of contact with the tire. This gave practically irreversible steering and prevented vibration of the steering lever. The motor was fed by a spray carburetor of the

constant-level, overflow type, and ignited by make-and-break electric spark. The engine shaft stood vertical with the flywheel on the lower end, the surface of which was used as a friction driving disk. Under this was the cross countershaft, with small sprockets on its ends and chains running back to large sprockets on the rear wheels. This shaft carried a large driven drum, and between the face of the driving disk and driven drum a short belt was fed by the shifting lever, which permitted wide variations of speed, as in modern friction-drive vehicles. An up-and-down movement of the steering lever actuated the shifting device, making a one-hand control as simple as driving a horse.

In modern gasoline automobiles the power is usually transmitted through a friction clutch, train of gears, and propeller shaft to a differential gear inclosed in the rear line axle, whence it is conveyed to the driving wheels. This is known as the shaft-drive system and is generally used for light and medium-powered cars. The chain-drive system, somewhat similar to that of the early Duryea machine, is preferred for heavy commercial vehicles which do not use a worm drive or screw gear as a means of transmitting power from the gear box to the rear axle. English pleasure vehicles generally use the worm drive, but the shaft drive preferred in American practice is clean, positive, mechanically simpler, and needs no troublesome lubrication.

Gasoline motors used in road vehicles are usually water cooled, and comprise two, four, six, eight, and sometimes as many as twelve cylinders, cast in blocks, with water jackets, combination valve chambers, and an intake manifold for fuel gas. In some cases air-cooling is used with notable success, and obviates the difficulty of water freezing in winter, besides making a lighter engine. For water cooling a radiator is necessary to subdivide the fluid which circulates around the cylinders and valve chambers, and bring every channel into close contact with the air tubes. A driven fan keeps up an air movement more rapid than that of the car itself and increases the radiation. The control of the motor by spark and throttle is effected by levers on the steering post, and steering is done by means of a wheel instead of the long lever originally used. This lever, however, survives in electric automobiles. Foot levers throw the clutch in or out, apply the brake, and control the fuel supply, as a substitute for the hand throttle or gas lever. A hand brake is also used for emergency stops. Self-starting and lighting apparatus is also provided by means of a storage battery.

Power is developed in the gasoline engine by taking a charge of fuel mixed with air into the cylinders, compressing it, and igniting it so that it will burn, and produce heat and pressure. This pressure is exerted on the pistons, which turn the crank shaft and through various connections the rear wheels. The ignition of the mixture is obtained universally today by the use of an electric spark. To produce this spark at a desired point in each cylinder a spark plug is employed. Practically all automobile engines use the jump spark. In the jump spark type of plug there are two metal points projecting into the cylinder. These points are insulated from each other electrically by means of a porcelain or mica sleeve and the ends of the points are set so that there is a space of about 1-32 of an inch between them. A very high electrical pressure is generated and admitted to the spark plug by means of a wire which is attached to the terminal communicating with one of the points. The pressure is sufficient to cause the electricity to jump the small gap separating the points, causing an electric spark. It is this spark which ignites the gas in the cylinder.

To generate this high pressure or high voltage current there are two general systems employed: First, the high tension magneto, which is entirely self-contained and generates current only when the engine is running. This system is used on very few cars today. The second system, or battery ignition system, has come into general use because the battery is required for lights and starting and is therefore available for ignition purposes. In the battery system a low pressure current, usually of six volts, is supplied by the battery to an induction coil. This coil is so constructed that it tranforms or changes this low

pressure to the high pressure required by the spark plug. In order to obtain the spark it is necessary to have the low pressure primary current that flows from the battery through the coil interrupted, and for this purpose interrupter points are provided. These are included in the igniter, which also has provision for distributing the higher pressure secondary current to the different cylinders, as a spark is required by each. In modern battery systems the current drawn from the battery for ignition is replaced by a generator whenever the engine is running. When the engine is idle or turning at very low speed its current is drawn from the battery.

In recent years the automobile industry in the United States has become of vast importance, employing hundreds of factories in the manufacture of passenger and freight vehicles, bodies, parts, and accessories. The manufacturing tendency is toward the output of closed vehicles for passenger use, these including limousines, sedan, and coupes in the highest style of the coach builder's art. The banner year of the industry in the United States up to 1922 was in 1920, when a total of 2,205,000 cars and trucks were manufactured. In 1921 production fell off to 1,823,100, but in 1922 the total output of cars and trucks reached the amazing figure of 2,527,000, with a wholesale value of $1,558,567,000. The number of employees in motor vehicle plants and allied lines in 1922 was 2,431,400, this industry thus taking first rank in the United States. Statistics showed that this country then had 81 per cent of the world's total registration of motor vehicles, the number of cars known to be in use January 1, 1923, being 12,750,000. Of the total registration of motor vehicles in the United States there are 10,250,000 passenger cars and 1,250,000 trucks; while on the farms of the country there are 3,300,000 cars and 200,000 trucks. The automobile industry uses 20 per cent of the total supply of rubber, 30 per cent of the plate glass supply, and 20 per cent of the aluminum supply. The gasoline consumed in the United States by automobiles in 1922 was 5,300,000,000 gallons. There were 400,000 carloads of automobile freight shipped by railroad during the year. Truly a marvel of industrial achievement in little more than a quarter of a century, with a public demand for automobiles still far from satisfied.

Autumn, the third season of the year—following the summer—the fall of the year. Astronomically, it extends from the autumnal equinox, September 22d, to the winter solstice, December 21st. In America, as popularly understood, it comprises September, October, and November. In Great Britain it is held to come and end a month earlier. The term, fall, is considered an Americanism. It has reference to the falling of leaves. In the northern hemisphere autumn is the season of harvest, of ingathering. The poet Spenser has described the season in joyous language:

Then came the Autumn all in yellow clad,
As though he joyed in his plenteous store,
Laden with fruits that made him laugh, full glad
That he had banished hunger . . .

Upon his head a wreath, that was enrolled
With ears of corn of every sort, he bore;
And in his hand a sickle he did hold,
To reap the ripening fruits the earth had yold.

Avalanche, the fall of a mass of ice or snow from a mountain slope. Ordinary avalanches are of frequent, even momentary, occurrence in mountain regions, but they are ordinarily so small or so far above the line of habitation that they do no harm. Occasionally, however, immense accumulations slip loose and go crashing down through the forests into the valley below. The Union Pacific Railway protects long stretches of its tracks with strongly framed snow sheds calculated to uphold the weight of snow that comes sliding down all winter. The region most noted for avalanches, or at least the region in which they have been studied most closely, is that of the Alps. Mountain climbers regard the danger from avalanches as the greatest risk they take.

Avalon, ăv′ȧ-lŏn, or **Avilion,** a-vĭl′ion, in Celtic romance, an island in the western seas. It was regarded as an earthly paradise to which the souls of great heroes, like King Arthur, were borne at death. A castle built of loadstone stood on this Isle of Souls and was the abode of Ober-

on and Morgan le Fay. The word Avalon means literally "Place of Apples." The apple was the only important fruit known to the northern nations; hence the Welsh gave this name to their soul-kingdom, as indicative of a high degree of enjoyment. The Land of the Blessed and the Vale of Avalon were also terms applied to this mythical island. In the *Idylls of the King* Tennyson tells us that it had been prophesied that Arthur should never die,

> He passes to the Isle Avilion,
> He passes and is healed and cannot die.

In the last Idyll, Arthur, wounded, says to Sir Bedivere:

> I am going a long way
> With these thou seest—if indeed I go—
> For all my mind is clouded with a doubt—
> To the island-valley of Avilion;
> Where falls not hail, or rain, or any snow,
> Nor ever wind blows loudly; but it lies
> Deep-meadow'd, happy, fair with orchard lawns
> And bowery hollows crown'd with summer sea,
> Where I will heal me of my grievous wound.

Avernus, ȧ-ver'nŭs, a small lake in Campania, Italy, not far from Naples. It was believed by the ancients to be the entrance to the infernal regions. The lake fills the crater of an extinct volcano. It is very deep, and was formerly surrounded by immense and gloomy forests. Owing to poisonous vapors arising from its waters, no animal life was found on its shores, and birds attempting to fly across it were killed. Avernus is situated, moreover, the volcanic region near Vesuvius, where the earth is frequently shaken by imprisoned vapors. Strange rumbling noises are heard. It is not strange that the fables concerning the world of shades should have centered here. The lake, it is said, has lost its wild and desolate appearance in modern times.

Averroës, a-ver'ō-ez, a Saracenic physician and philosopher. He lived about 1126-1198. He was born at Cordova, Spain, the capital city of western Mohammedanism. He came of an ancient and noble family. His father was the high priest and the chief judge of the city. Averroës is known chiefly as an admirer of Aristotle and Galen, to an examination of whose doctrines he devoted ten large volumes. He was called "the soul of Aristotle." He left also a digest on medicine, in which, among points of interest, he calls attention to the freedom of smallpox patients from a second attack. This medical digest, really a textbook on medicine, is known as the *Colliget.* It is believed that Averroës understood neither Greek nor Syrian. He read Aristotle in an Arabic translation. Averroës left his writings in Arabic manuscript. They ruled supreme in medicine for several centuries. The University of Padua, Italy, was called the seat and center of "Averroist Aristotelianism." After the invention of printing the writings of this eminent man passed through many Latin editions. Some fifty editions were printed at Venice. Over a hundred editions were issued between 1480 and 1580. Manuscript copies in the Arabic of the greater part of his writings are preserved in the library of the Escurial and other libraries.

Ave Maria (Latin Hail Mary), a form of address to the Virgin Mary, embodying a plea for intercession. It is used by Roman Catholics in connection with the Lord's Prayer. The salutation of the Archangel Gabriel (Luke I. 28) to Mary: "Hail, (Mary) full of Grace, the Lord is with thee;" then follows the address of Mary to her cousin Elizabeth (verse 42), "Blessed art thou among women, and blessed is the fruit of thy womb;" after which comes the third phrase: "Holy Mary, Mother of God, pray for us sinners now and in the hour of our death." These three form the "Hail Mary," the last phrase being added in the fifteenth century, popularly traced to Italy and St. Dominic. The present form was first used in 1514. The daily use of the whole prayer was ordered by Pius V. in 1568. The "Hail, Mary," was added to the Lord's prayer, it is thought, in the eleventh or twelfth century.

Aviation. See AIRSHIP.

Avicenna (980-1037), a famous Arabian physician. He died at Hamadan, Persia. He wrote a system of medicine, which was practically an Arabian presentation of Greek medicine as given in the treatise of Galen. His works were translated into many languages and were

venerated in European universities. At one time an authority, Avicenna is now forgotten. At one time as familiar to scholars as Darwin or Tennyson, today Avicenna is scarcely a name. See GALEN.

Avignon, ä-vēn-yōn′, a French city. It is situated on a beautiful plain on the east bank of the Rhone. It is the chief town of the department of Vaucluse. The particular site of the city was determined by a precipitous rock rising from the river's edge. This rock was no doubt at one time the site of a castle, in the shelter of which the town grew up. The walls of the city are among the best preserved in Europe. They are surrounded by extensive boulevards, occupying the space once devoted to protective ditches. Avignon was an important post in the time of the Roman Empire. Many Roman antiquities are preserved in the museum.

The city was a part of the early kingdom of Burgundy, after which it was for a time one of the many petty republics. From 1309 to 1377 the popes, elected and controlled by French influence, resided at Avignon. This seventy years is spoken of as "The Babylonian Captivity of the Church." French anti-popes kept the semblance of a papal court here until 1418. The chief building of the city is the palace of the popes. It covers an area of an acre and a quarter. It was used for a long time by the French for military barracks and was much abused, but it has been restored. Avignon was papal territory from 1348 until wrested from the church by the French at the time of the French Revolution. Petrarch resided in Avignon for a time. The Laura of his sonnets is said to have been buried in the church of Cordeliers. Although destroyed long ago, guides still claim to show her tomb to visitors.

The modern town has a multitude of antique houses, situated on narrow, crooked, not altogether savory streets. The city is the center of the silk industry. Raising silk worms, reeling raw silk, and weaving silks, velvets, and ribbons occupy the majority of the inhabitants of the district. There are also manufactures of paper, leather, hats, and jewelry. The population of the city and district is 49,304.

Avignon is subject to dry African winds. One of these is known as the mistral. According to an Italian proverb, the city is known as "Windy Avignon, subject to plague without the wind, and plagued with the wind when it has it!"

See VAUCLUSE; PETRARCH; FRANCE.

Avocet, ăv′o-sĕt, a wading bird resembling the sandpiper. It is a native of North America, Europe, Asia, and Africa. The avocet is noticeable for a slender, upcurved bill and webbed feet. The American species, about sixteen inches in length, is an inland bird with a cinnamon colored head and neck, and having a white back, tail, and underparts. Portions of the wings are black. It has stilt-like, long, wading legs, and uses its bill in a peculiar manner. It wades rapidly in muddy water and swings the upturned end of its bill to and fro, sidewise like a scythe, searching on the bottom for snails, crayfish, etc. It has powerful wings, often used for swimming. The avocet nests in bare marshy places, and lays three to four pale olive, chocolate-spotted eggs. See BIRD.

Avogad′ro, Amadeo (1776-1856), a noted professor of physics at Turin. Remembered as the discoverer of what is known as Avogadro's Law: "Equal volumes of all gases, under the same conditions as to temperature and pressure, contain the same number of molecules."

Av′oirdupois (French, to have weight), a system of weights based on a pound of sixteen ounces or 7,000 Troy grains. It was introduced into England from Bayonne, France, about 1300 A. D. It has been inherited by the colonies of England. It is used chiefly for the weighing of coarse commodities. The principal denominations are the ounce, pound, hundredweight, and ton,—the latter consisting of twenty hundredweight. See TROY WEIGHT.

Avon, the name of several English rivers. The word is British, meaning water. The Upper Avon rises near Naseby, Northampton. It forms the border of Leicester. It passes through Warwickshire and Worcestershire to the Severn

at Tewkesbury. Its valley is one of the most beautiful in England. Rugby, Warwick, and Stratford-on-Avon are situated on its banks. It is about 100 miles in length. This is the Avon of Shakespeare, the stream from which he is called the "Avon Bard." Lower Avon, or Bristol Avon, flows into the Severn after it has become so broad that it is known rather as Bristol Channel. Bath and Bristol are on its banks. It is about eighty miles in length. This is the Avon on which the ashes of Wyclif were cast. The East Avon flows into the English Channel. It is about sixty-five miles in length. Salisbury, with its ancient cathedral, is situated at the junction of the Wily and Bourne with the East Avon.

Ax, a long-handled implement for chopping wood. The axes of primitive man appear to have been chips of flint, sharp-edged stones, and bones or clam shells tied to handles by thongs of rawhide. The islanders of the southern Pacific Ocean, it is said, still chop with stone axes. The next step in ax making was the casting of axes of bronze. As soon as the art of casting had been learned, it was easy to cast axes with a hole in the head for the insertion of the handle. The third step was the making of iron and steel axes. In colonial days axes were made by the village blacksmith. The factory-made ax is a recent development. The greatest ax factory in the world, the Collins, of Connecticut, turns out an average of 5,000 axes daily. To save frequent grinding lumbermen now prefer to use a double-bitted ax, having a straight handle. European wood-choppers prefer a wide-bladed ax, much like a broad-ax. They do not like the American ax. Gladstone was fond of chopping. An American friend sent him an American ax, but the statesman did not like to chop with it.

Axiom, a truth requiring no proof. The term is sometimes applied to any important and generally accepted truth, as, in political economy, "cheap money drives good money out of circulation"; in logic, "he who admits a principle admits its consequence"; in natural history, "mountain ranges restrict and direct migrations"; in geography, "an increased altitude lowers the temperature"; in sociology, "character is affected by associations," etc. The term is restricted more properly, however, to self-evident mathematical truths, as, for instance: "The whole is greater than any of its parts"; "Things which are equal to the same thing are equal to each other"; "Two straight lines cannot enclose a space," etc. Euclid recognized fifteen geometrical axioms.

Ayr, or **Ayrshire,** a county of southwestern Scotland. It is known best as the dairy district in which the Ayrshire cow originated. It is a productive county of varied resources. A countryside rhyme, the better understood if we bear in mind that "coo" mean cow and "woo" wool, assigns honors to the various districts of the county as follows:

> Kyle for a man;
> Carrick for a coo:
> Cunningham for butter and cheese;
> And Galloway for woo.

Historically the shire is the former scene of many of the daring deeds of Wallace and Robert Bruce. It was overrun by Cromwell and saw its full share of stirring events in Covenanter times. In literature Ayrshire is celebrated as the "Land of Burns." His *Bonnie Doon* rose in its hills. His mountain daisy, "wee, modest, crimson-tipped flow'r," and his field mouse, "timorous beastie," were seen here.

> Auld Ayr whom ne'er a town surpasses
> For honest men and bonnie lasses

is the county seat. The *Tam O'Shanter* inn now has above the door a picture of Tam "weel mounted on his gray mare Meg," and within are the very "chair and caups" used by Burns's heroes. The water Ayr and the Auld Brig are here, but the New Bridge has been replaced by a safer structure. In the near vicinity the traveler may see "Alloway's auld haunted Kirk" and may visit the thatched cottage where Burns was born. See BURNS; ALLOWAY KIRK.

Aytoun, ā′ton, **William Edmondstoune** (1813-1865), an Edinburgh poet, humorist, and writer of short stories. He studied for the bar but disliked the pro-

fession and took to writing instead. In 1845 he was appointed professor of rhetoric and English literature in the University of Edinburgh, which position he held until his death. In 1854 he became editor of *Blackwood's Magazine*. Professor Aytoun was the author of the *Life and Times of Richard I, Firmilian, a Spasmodic Tragedy,* the poem, *Bothwell,* and a novel, *Norman Sinclair*. His best known work, however, was *Lays of the Scottish Cavaliers,* which has passed through a large number of editions. Stedman says that these ballads "rank among the worthiest of their class." *The Execution of Montrose,* and *Edinburgh after Flodden,* are probably the best of Aytoun's ballads. In 1849 Aytoun married the youngest daughter of Professor John Wilson, better known by his pen name of Christopher North. A story runs to the effect that when Miss Wilson entered her father's study to ask permission to wed, he wrote "With the author's compliments" on a piece of paper and pinned it on her back. He then sent her to her lover in the parlor, as though she were a presentation copy of his latest work.

In the work of Professor Aytoun, similar in kind to Macaulay's but more varied, and upon Scottish themes, we also discern what wholesome and noteworthy verse may be composed by a man who, if not a poet of high rank, is of too honest a breed to resort to unwonted styles, and to measures inconsonant with the English tongue. —Stedman.

Azalea. See RHODODENDRON.

Azores, ȧ-zōrz′, a group of islands in the Atlantic, 800 miles off the coast of Portugal. Area, 922 square miles. Population, 256,291. The islands have long been a possession of Portugal. The name is derived from a Portuguese word meaning a hawk. The entire group is volcanic. Repeated eruptions and earthquake shocks are reported, the latest in 1867. It is interesting to know what plants and animals are found in these rugged islands so far out at sea. Of 478 species of plants, only four grow in America, forty are found nowhere but on the Azores, and over 400 are native to the mainland of Europe. Tropical fruits, such as the orange, lemon, and banana are raised to advantage. Hemp and the ordinary cereal grains are produced. Wine and figs are exported. Of wild animals, the rat, mouse, weasel, and ferret have followed civilization. Bats are found in the cliffs. The coasts swarm with fish. Several species of birds are so numerous as to injure the fields of small grain seriously. A bounty offered for their destruction includes the canary. The *Britannica* is our authority for a statement that the bounty for a single year represented a long list of 420,000 birds, including the bullfinch, chaffinch, redbreast, blackbird, and canary. The woodcock, partridge, quail, and snipe are found in the islands.

Azov, Sea of, a shallow, Russian branch of the Black Sea. It is eighty miles wide and perhaps twice that distance in length. Area, 14,000 square miles. It nowhere exceeds fifty feet in depth. It receives the Don. It abounds in fish. There are several safe harbors. The waters, particularly of the western part, are so offensive as to win the name of "The Putrid Sea." The Russians have constructed a military road along the coast of Crimea.

Azrael, ăz′ră-ĕl, in Hebrew and Mohammedan mythology, the angel of Death. He is represented as watching over the dying and separating the soul from the body. In Longfellow's *Tales of a Wayside Inn,* the Spanish Jew's story is entitled *Azrael,* and the Death angel appears as one of the characters in the tale.

Aztecs, ăz′tĕks, a tribe of Mexican Indians. The name is used not infrequently to include all Mexican Indians, but, speaking strictly, it applies to a single tribe only. The Indian name has been interpreted to mean "heron place," and refers to some former home, or else the clan name of the tribe.

The first date that can be given positively is 1325. In that year the Aztecs occupied some islands in a salty lagoon where the outlet of two smaller lakes flows into a larger one. By means of dikes, causeways, and walls, they built up these islands into a stronghold which they named Tenochtitlan. This old time Indian Venice is the modern city of Mexi-

co. About a hundred years later the Aztecs formed a league with related tribes. This was in no sense an Aztec kingdom, or empire, but simply a robbers' league. The tribes composing the Aztec Confederacy agreed to make raids in common and to divide the spoils of war systematically. They subjugated eight or nine thousand square miles of territory, extending east and southeast. There were no roads in the modern sense of the term. The plundering warriors made their way out and home again by the merest mountain trails.

The Aztecs lived in large buildings of many rooms, each building housing perhaps several hundred persons. Sometimes a number of these buildings were erected contiguously in order to accommodate an entire clan. A separate building was put up in which the chiefs might convene. Business was transacted here. The buildings were made of adobe or of stone. They seem in many respects to have been like the pueblos of our southwestern Indians. The Aztec Confederacy ruled some thirty pueblo towns. When Cortez invaded Mexico in 1519 the native ruler of the Aztecs was Montezuma. The Spaniards were much surprised to find a people so advanced. Their previous conception of the American Indians had been gained from contact with the natives of the West Indies and of southern coasts. The Aztecs had made considerable progress. Both men and women were expected to marry, and, in fact, were required to do so. The land belonged to the clan, but each householder was given his own garden plot as long as he made use of it. Irrigation was practiced. Some progress had been made in the cultivation of fruits and vegetables.

It is claimed that floating gardens, towed by canoes from one part of the lake to another, were constructed by the Aztecs and still supply the City of Mexico with a part of its fruit and vegetables. They dug the soil with copper mattocks and made holes for their seed corn with sticks pointed and hardened in the fire. In each field a man in an elevated tower kept watch with stones and a sling to defend the crops, garden, and orchard, against parrots, toucans, grosbeaks, and sparrows,—a duty still necessary. Stone granaries, believed to have been constructed prior to the Spanish Conquest, are still used for storage.

Dogs, turkeys, quails, ducks, deer, rabbits, fishes, and the axolotl were raised for meat. Cattle, goats, and chickens were not known in the New World. People of leisure went hunting with bows, nets, traps, and blow guns. Black beans, corn meal cakes, and chocolate were articles of diet and drink. The Aztecs had no butter and milk, but tapioca, sago, sweet potatoes, onions, palm tree wine, salt, pepper, tomatoes, and squashes were well known. They sat at meat on low benches about a mat on which regular meals were served. Cotton cloth served for scanty clothing. In tanning furs and bird skins they excelled. Their furniture was simple. Rush mats served for beds with a block of wood for a pillow. To obtain a fire, two pieces of dry wood were rubbed together, or fire might be brought from a temple in which it was never allowed to go out. Pine torches took the place of candles, and the pulp of a certain root was used for soap.

The homes of the more wealthy Aztecs appear to have been adorned with unusual skill. Gaily colored tapestries of fine needlework were hung in the doorways. The women excelled in making ornamental featherwork, and, in particular, mantles formed from the skins of humming birds. Among the articles of domestic manufacture or of plunder brought home by the warriors from their raids were colored feathers, sacks of chocolate, cougar skins, birds' wings, ingots of gold, sacks of cochineal, vases of gold dust, necklaces of emeralds, pieces of amber, rock crystal, earrings, rubber, building bamboo, arrows, aromatic woods, measures of honey, vases of ochre, copper hatchets, precious turquoises, writing paper, parchment, gourds, mats, lime, posts, birds, eagles, and beasts.

Truth compels addition of the fact, however, that the prizes most highly valued were prisoners of war. The Aztecs were cannibals. The prisoners were first sacrificed, then distributed, to be eaten at

feasts. Referring to this feature of Aztec life, the author of a very able article in the *Americana* writes: "The people were cannibals, and their religion was of the most hideous character; albeit with regularly organized priesthood and temples and altars. On one side the society touched the South Sea Islands, on the other it almost rose to ancient Egypt and was above Homeric Greece."

The accounts given of the Aztecs by the Spanish chroniclers are not trustworthy. The following statement, however, is too good not to be true: "Children were taught a useful occupation and were kept busy and out of mischief. Some of the doctrines taught the Aztec youth were:

"Revere and salute thy elders. Mock not at old men, my son, nor at deformed people.

"When one speaks, hear with attention and respect.

"When thou talkest with anyone, take not hold of his garment.

"Talk not too much, and interrupt not others.

"If not silent, weigh thy words.

"When at table, eat not too fast.

"Live by thy work.

"If thou growest rich, become not insolent.

"Lie not, for it is a sin."

A recent traveler says, "All at once a bamboo cabin, surrounded by sharp-leaved yuccas, and shaded by banana trees, appears on the edge of the stream. A man of medium height, with a copper colored skin, a flat nose, a gentle look, coarse thick hair, and a beardless chin, stands at the threshold. Children of both sexes entirely naked, their stomachs distended, run and hide behind a woman who is occupied in grinding maize on a block of lava. Her rather gross body is covered only by a petticoat scarcely reaching to the knees. You look with surprise at these Indians, descendants of the powerful race whom Cortez conquered and who, though humble and timid, have for the last three centuries obstinately repelled everything of European origin." Thousands of these people live in villages about the city of Mexico. See CORTEZ, HERNANDO.

Azurite (from its azure color), a basic copper carbonate, containing about 55 per cent of copper and crystallizing into the monoclinic system. It differs in composition from malachite only by containing more carbonic acid and less water. Azurite occurs in sharply defined crystals of a rich dark blue color, in columnar masses and velvet-like incrustations. It is usually found with malachite and other ores of copper. In Siberia, where it is found, it is cut in thin slabs and is used for table tops and similar purposes.

The azurite crystals found in Arizona rank as gems and are much in favor. The Copper Queen Mine in the Bisbee district has produced solid masses of azurite and malachite, weighing several tons. Its original source is copper sulphide, which is found in the deeper portions of mines. Azurite is also used as a pigment.

B

Baal, the chief deity of the ancient Canaanites. He was regarded as the male element of creation, the female counterpart being Astoreth or Astarte. The altars of Baal were erected on heights or on house-tops. Offerings of incense, bulls, and, on occasion, human sacrifices—children in particular—were laid on the altar. Wild orgies seem to have been a feature of the worship. In art, Baal is represented riding a bull, the symbol of generative power. Grapes and pomegranates are in his hand to denote productivity. Baal was worshiped also as a sun god, the source of life. Baal means lord or master. The word appears in many combinations. Baalzebub, or Hebrew Beelzebub, means "lord of flies"; Hannibal, "the lord is gracious"; Hasdrubal, "the lord is helpful"; Baalbec, "the city of Baal," etc. Baal or a counterpart had several names. In Assyria and Babylonia, Baal was worshiped as Bel. Among the Moabites he was known as Chemosh, and his chief cult was on Baal Peor. The Ammonites worshiped the same deity under the name of Moloch. Tyre called him Melcarth, etc. See MOLOCH.

Baalbec, an ancient city of Syria. It occupied a beautiful irrigated valley in the Anti-Lebanon Mountains, on the highway from Tyre to Palmyra. It is about thirty-four miles northwest of Damascus. The Greeks called it Heliopolis, both names meaning "City of the Sun." Baalbec was an important trading post of the Phoenicians. A part of the acropolis wall, dating, no doubt, from a day of Tyrian supremacy, yet stands. Three stones raised twenty feet above the ground are of enormous size. The smallest of the three is sixty-three feet long and thirteen feet thick. The marvel is how these worshipers of Baal ever quarried such stones or got them into position.

In the long centuries of the present era the Romans crowned the acropolis of this city with three temples, the ruins of which are still the marvel of antiquarians. The great temple of Jupiter stood on a magnificent elevated platform of three or four acres in extent. Stately stairs rose up to a portico adorned with costly pillars. The great court of this immense temple was square. It was surrounded by a peristyle of fifty-four columns, each sixty-two feet high and seven feet in diameter at the base. At last accounts a few of these columns were still standing. A second building, The Temple of the Sun, though small in comparison with the first, is still larger than the Parthenon. Though not so perfect in its proportions, it must have been a more imposing edifice. Still a third ruin is that of the Circular Temple near by. It was built in exquisite Corinthian style, evincing wealth, leisure, and good taste. The money for such buildings came from the caravan trade. The labor was extorted no doubt from soldiers in time of peace, or from slaves. In 1400 Baalbec was plundered by Timur on his way to Damascus. Frequent earthquakes have completed the work of destruction. The marvelous ruins of this city, now almost forgotten, indicate vast commercial resources. Under beneficent rule and intelligent public policy the prosperity of Syria will return. The soil and possibilities are there. The new cities may not occupy the sites of the old cities, but there are dawning indications that a prosperous people may one day regard the ruins of Baalbec as interesting antiquities, and not as now, the symbol of utter desolation.

From the accounts of Oriental writers, Baalbec seems to have continued a place of importance down to the time of the Moslem invasion of Syria. They describe it as one of the most splendid of Syrian cities, enriched with stately palaces, adorned with monuments of ancient times, and abounding with trees, fountains, and whatever contributes to luxurious enjoyment. After the capture of Damascus it was regularly invested by the Moslems, and after a courageous defence at length capitulated. The ransom exacted by the conquerors was 2,000 ounces of gold, 4,000 ounces of silver, 2,000 silk vests, and 1,000 swords, together with the arms of the garrison. The city afterwards became the mart

for the rich pillage of Syria; but its prosperity soon received a fatal blow from the caliph of Damascus, by whom it was sacked and dismantled, and the principal inhabitants put to the sword (748 A. D.). It continued, however, to be a place of military importance, and was frequently an object of contest between the caliphs of Egypt and the various Syrian dynasties.—*Britannica.*

Babbitt, or **Babbitt's Metal,** an alloy much employed for machine boxings. This alloy was discovered and patented in 1839 by a Mr. Charles Babbitt of Taunton, Massachusetts, a goldsmith and manufacturer of britannia ware. Metal used for boxings must be tough, it must not crush easily, and it must possess anti-friction qualities. Mr. Babbitt started with twenty-four parts of tin for smoothness, four parts of copper for strength, and eight parts of antimony for solidity. Genuine babbitt is unsurpassed for ordinary journal purposes. Many manufacturers use a greater proportion of tin. Cheaper and less serviceable imitations are made partly of lead.

The greatest mistake in using babbitt metal is heating too hot before pouring. When the metal is hot enough to light a small pine stick, it is ready to pour. Never heat the metal until it shows red. Babbit that has been overheated or burnt crystallizes, and when poured is brittle, hard, and not homogeneous. Never mix overheated metal with the good hoping to restore it, as such mixed metal will be brittle.—*Popular Mechanics.*

Babcock Test, a scheme devised by Professor Babcock of the Wisconsin Agricultural Experiment Station in 1890, for determining in a simple, practical way, and with considerable accuracy, the per cent of butter fat in milk. Sulphuric acid is added to the milk, which has the effect of decomposing the solids other than the fat. The heat of chemical action causes the fat particles to collect and rise to the top, which is facilitated by rapid rotation in a machine constructed for the purpose. The per cent of cream can then be read directly from the neck of the tube, the whole operation taking but a few minutes. Creameries make regular tests of their patrons' milk, paying for it on a basis of cream value. A dairyman may also test the milk of each individual cow, and, if it does not come up to the standard, eliminate the animal from the herd. The Babcock Test has been a wonderful incentive to improvement in the dairy cow; it is a case of the survival of the fittest.

Babel, the native name of the ancient city of Babylon, meaning Gate of God. According to Genesis, the children of Noah journeyed into the plain of Shinar to erect a tower, known as the Tower of Babel, which should reach unto heaven. They were prevented from carrying out their impious design through a confusion of tongues. Being unable to understand each other, they broke up into small parties and separated. Curiously enough, the cuneiform inscriptions recently exhumed in the ruins of the old Babylonian Library relate at some length the history of a lofty tower which came to grief,—some accounts say through a high wind. This is not at all improbable, when we recall that the building material of Mesopotamia consisted for the most part of adobe or sun-dried brick. The word babel has passed into literature to indicate a jargon of sounds. See BABYLON.

All great works in this world spring from the ruins
Of greater projects—ever, on our earth,
Babels men block out, Babylons they build.
—Robert Browning.

Babes in the Wood, or **Children in the Wood,** an old English ballad of unknown authorship. The story has been thought to be a disguised account of the alleged murder of his nephews by Richard III. It has been retold many times, both in prose and verse. It appears in a form long popular in S. Baring-Gould's *Nursery Songs and Rhymes.*

Poor babes in the wood, poor babes in the wood,
So hard was the fate of the babes in the wood.
When a child on the knee, how silent I'd be,
While my mother related the story to me.

My dear, you must know that a long time ago,
Two poor little children whose names I don't know
Were stolen away on a fine summer's day,
And left in a wood, as I've heard people say.
Poor babes in the wood, poor babes in the wood!
So hard was the fate of the babes in the wood.

And when it was night, so bad was their plight,
The sun it went down, and the stars gave no light.
They sobbed and they sighed, and they bitterly cried,

And the poor little things they lay down and died.
Poor babes in the wood, etc.

And when they were dead, the robins so red,
Brought strawberry leaves, and over them spread.
And all the day long, the branches among,
They mournfully whistled, and this was their song:
Poor babes in the wood, etc.

Baboon, a large, shaggy, fierce member of the monkey family. There are several species in the rocky parts of Abyssinia, Arabia, North Africa, and Cape Colony. The baboon has a prominent snout, a low forehead, and a profile to which the name "dog-faced" has been applied. It has a heavy mane. The face and the buttocks are bare, and are highly colored—blue, scarlet, and pink. The arms and legs are nearly of a length, permitting it to go on all fours, which it does with a galloping motion, making unexpected speed, especially in climbing among the rocks. The baboon feeds in flocks. It lives chiefly on fruits, roots, birds' eggs, and insects. It fills its large cheek pouch greedily with food before it begins to eat, in order that it may be able to carry away a supply in case of sudden alarm. A baboon has been seen to put eight eggs into its cheek-pouches at once; then take out the eggs, one by one, break the shell at the end, and deliberately suck their contents. The baboon is about the size of a mastiff. The visit of a troop of these animals is greatly dreaded by the African planter; for the baboon is voracious, destructive, and filthy beyond description. It is the most repulsive of the monkey family. It is strong, sullen, not easily tamed, and seems to have no redeeming quality. See MONKEY.

Babylon, an ancient capital and metropolis of Babylonia. It appears to have been one of several important cities. It succeeded Ur of the Chaldees as the capital. It was in turn supplanted by Nineveh, and reduced to the position of a provincial town of the Assyrian Empire. In 690 B. C. it revolted, and was subdued by Sennacherib, who writes that he "pulled down, dug up, and burned with fire the town and the palaces, root and branch; destroyed the fortress and the double wall, the temples of the gods, and the towers of brick, and threw the rubbish into the river." Under Nebuchadnezzar, however, the city was rebuilt. The later city is the Babylon of the Scriptures, whose ruins are still the astonishment of scholars.

Just what credence is due to Herodotus and other ancient writers it is impossible to say; but we are told that the city was laid out in the form of a square, occupying both sides of the river Euphrates. According to these accounts, it was surrounded by an astonishing brick wall 300 feet high, 85 feet wide, and from 40 to 60 miles in length. This wall included about 200 square miles of territory. A moat ran along the outside of the wall. The clay dug from the moat sufficed to make sun-dried brick for the wall. The wall was guarded by 250 towers. It was broad enough to allow four-horse chariots to turn about on it, and was pierced by 100 brass gates hung in brazen frames. A wall ran along each bank of the Euphrates and was pierced by twenty-five gates. Quays led from the gates to the water's edge. Ferry boats crossed the river from quay to quay. A roofed bridge of masonry crossed the Euphrates on stone piers, and joined the central parts of the city. It was defended by a citadel or royal palace at each end. The city proper was surrounded by orchards and gardens watered by canals from the Euphrates. The building material of the Babylonians consisted of adobe or sun-dried brick, with facings of vitrified tiles or painted plaster for ornamentation. Blocks of stone, quarried in distant Armenia, were used only for sculpture and inside finish of the most expensive kind.

The hanging gardens of Babylon were considered one of the wonders of the world. They were gardens of trees and flowers, planted on terraces, one upon another, to the height of not less than 150 feet. Water for these plants was elevated by means of a device supposed to resemble the screw of Archimedes. The most noteworthy edifice was the Temple of Bel. It was a pyramid of eight square terraces, one above the other. The lowest measured 600 feet on a side. A winding ascent led

to the topmost terrace on which stood a shrine containing a golden image of the god forty feet in height, and a golden table forty feet long and fifteen feet broad. Two smaller statues were made of the same precious material. The total amount of gold, if ancient accounts may be believed, was something enormous. This, like all other Chaldean temples, stood with a corner turned toward each of the four cardinal points of the compass.

The immense buildings of the Babylonians were made possible not only by the vast wealth derived from tributary towns and peoples, but from the taxes levied on merchants who resorted thither with their caravans from the east and from the west.

Recent excavations have unearthed many evidences of Chaldean scholarship. Their literature was engraved in cuneiform characters with a sharp tool on fresh tablets of clay, which were afterward placed in a furnace and baked. Many collections of these tablets, including one of 30,000, have been found in the ruins of Babylon. It is said that they were numbered and arranged as carefully as any modern collection of books. When a student selected his numbers from a catalog, the librarian was able to bring him the tablets without delay. Libraries and schools, universities, they might be called, were maintained in connection with the large temples. It is known that rolls of papyrus made from the reed which grows in the Euphrates as well as in the Nile were used also; but none of these have been preserved. The archives of the wealthy merchants contain deeds, contracts, mortgages, bills of sale, promissory notes, and other business documents engraved on tablets, extending, as shown by their dates, through several centuries. Even the names of business firms have been preserved in this way. From marriage contracts, wills, and signatures extant, it appears that a woman was legally enabled to own property and to carry on business in her own name. The duodecimal system of arithmetic and the number sixty appear to have been favored. Our division of the day and night into twelve hours each, of the hour into sixty minutes, and of the minute into sixty seconds is inherited from the Chaldeans. As might be inferred, they were astronomers and engineers. They divided the circle into 360 degrees, and the year into 360 days. The week of seven days is also an inheritance from them.

The literature of the Babylonians as it is preserved on these tablets is very interesting. It deals with conquest and pillage, with commercial methods, with fortune telling, geometry, and astronomy; with the healing art, with diplomacy and trading. Some sets of tablets are dictionaries; others are grammars, and others again are translations. One set found in 1902 contains a complete set of laws, the oldest legal code known. Some light is thrown on Babylonian customs by the penalties prescribed to prevent the bribery of officials, or overcharges, and for the punishment of ignorant physicians and dishonest and incompetent building contractors.

The moral literature of the Babylonians parallels many of the phrases and thoughts, in fact, entire passages, found in the Hebrew Scriptures. The chronologies of the two literatures agree remarkably well. The two accounts of the deluge are much the same. During the war between Babylon and Egypt the Israelites allied with the wrong side in the quarrel and were carried away to Babylon by Nebuchadnezzar as a punishment for having entered into an alliance with Egypt. During this period, known as the Babylonian Captivity, the lamentations of Jeremiah were written. It is small wonder that they show evidences of Babylonian influence.

The city stands on a broad plain, and is an exact square, 120 furlongs in length each way, so that the entire circuit is 480 furlongs. While such is its size, in magnificence there is no other city that approaches it. It is surrounded, in the first place, by a broad and deep moat, full of water, behind which rises a wall 50 royal cubits in width and 200 in height. And here I may not omit to tell the use to which the mould dug out of the great wall was turned, nor the manner wherein the wall was wrought. As fast as they dug the moat, the soil which they got from the cutting was made into bricks, and when a sufficient number were completed they baked the

bricks in kilns. Then they set to building, and began with bricking the borders of the moat, after which they proceeded to construct the wall itself, using throughout for their cement hot bitumen, and interposing a layer of wattled reeds at every thirtieth course of the brick. On the top, along the edges of the wall, they constructed buildings of a single chamber facing one another, leaving between them room for a four-horse chariot to turn. In the circuit of the wall are a hundred gates, all of brass, with brazen lintels and side posts. . . . In the middle of the precinct there was a tower of solid masonry a furlong in length and breadth, upon which was raised a second tower, and on that a third, and so on up to eight. The ascent to the top is on the outside, by a path which winds round all the towers. . . . On the topmost tower there is a spacious temple.—Herodotus.

Strabo and the historians of Alexander substitute 50 for the 200 cubits of Herodotus, and it may therefore be suspected that the latter author referred to hands, four of which were equal to the cubit. The measure, indeed, of 50 fathoms or 200 royal cubits for the walls of a city in a plain is quite preposterous. . . . My own belief is that the height of the walls of Babylon did not exceed 60 or 70 English feet.—H. C. Rawlinson.

Babylonia, in ancient geography a country situated in what is now the Arabian Empire. It included the valley of the Euphrates River from the vicinity of the modern city of Bagdad on the north to the Persian Gulf on the south, from the Arabian desert on the west to the Tigris River on the east. This district was not called Babylonia until two or three thousand years after it was inhabited by a civilized people. It was known by many names, some of them given probably from the different states or provinces that rose at different times into power. Two names have clung to the country and people, and are so used as to cause considerable confusion. One is Babylonia, from Babylon, the greatest city of the region, the other Chaldea, from that province whose inhabitants seem to have been of the highest and most forceful type. When at the summit of its power the Babylonian empire included also Palestine, Syria, and portions of Arabia. It is not to be classed, however, among the conquering nations. Babylonia is known rather for its pursuit of learning and the arts of peace. In fact with the exception of Egypt no national culture is of such antiquity as that of Babylonia, with which Egypt must share the title of "Cradle of Civilization" so often applied to that country.

The history of Babylonia as a civilized nation is supposed to have begun about 4500 B. C. For two thousand years or more from that date there were many states or provinces more or less independent, and many different dynasties. About 2800 B. C. "Ur of the Chaldees" became the seat of government; the city of Babylon comes into prominence five centuries later. It is to this early period and to its civilization that the term Chaldean monarchy and Chaldean civilization are applied most commonly and properly. About 1250 B. C. Babylonia was conquered by Assyria and remained subject thereto until 625 B. C. when Nabopolassar, viceroy of Babylon under the Assyrian king, threw off the Assyrian yoke and established the Second or Later Babylonian Empire, which continued until the Persians under Cyrus captured the city of Babylon. This period is called also the Later Chaldean Empire, but it seems more fitting that at this time the more united nation should take its name from its great city rather than from any one province or people. In the cuneiform inscriptions the name Chaldean appears no earlier than the ninth century, B. C. See CHALDEA; BABYLON; ASSYRIA; ARABIA.

Babylonian Captivity, The, in Jewish history, a period of exile at Babylon. Jerusalem lay near the great highway from Egypt to Babylonia. It was a fine point of diplomacy for the Hebrews to know whether to ally themselves with the inhabitants of the Nile or of the Euphrates. Great armies went back and forth on what may be termed this war path of nations, and treated the Hebrews as allies or foes, according to their latest conduct. In 605 B. C. Nebuchadnezzar besieged Jerusalem and carried off many prisoners. In 597 B. C. the siege was renewed and the Hebrew king, with 10,000 of the more prominent persons, was carried to Babylon. In 586 B. C. the destruction of the temple and the city was completed and the remaining inhabitants were massacred or carried off to Babylon. Here they worked and wept for two generations, until, in 536

B. C., Cyrus captured Babylon and gave the Jews permission to go home and rebuild their city. It is said that 43,000 men, women, and children took up the long march across the Euphrates. The Jews had been settled as colonists rather than slaves. Like the Pilgrims in Holland, they had maintained their language, family government, and forms of worship. Cyrus bade the priests of Bel restore the sacred vessels which had been taken from Jerusalem. These included 5,000 utensils of gold and silver, baskets, goblets, cups, and knives. A grandson of the old king Jeconiah led them.

Not all Jews desired to leave their Mesopotamian homes, but, according to M. Duneker, in his *History of Antiquity,* "it was a considerable multitude which left the land 'beyond the stream,' the waters of Babylon, to sit once more under the fig-tree in their ancient home, and build up the city of David and the temple of Jehovah from their ruins; 42,360 freemen, with 7,337 Hebrew men-servants and maid-servants; their goods were carried by 435 camels, 736 horses, 250 mules, and 6,720 asses. The exodus of the Jews from Babylon is accompanied by a prophet with cries of joy, and announcements filled with the wildest hopes. . . . 'Go forth from Babylon,' he cries: 'Fly from the land of the Chaldeans! Proclaim it with shouts of joy, tell it to the end of the earth and say: 'Jehovah hath redeemed his servant Jacob.' 'How beautiful upon the mountains are the feet of him that bringeth glad tidings, that publisheth peace, that saith unto Zion, Thy God reigneth. Up, up, go forth, touch no unclean person; go forth from among them. Cleanse yourselves, ye that bear Jehovah's vessels. Ye shall go forth in joy, and be led in peace; the mountains and the hills shall break forth before you into singing, and all the trees shall clap their hands. Jehovah goes before you and the God of Israel brings up the rear.' "

The seventy years of residence at Babylon immediately preceding the release is known as the Babylonian Captivity. For "Babylonian Captivity of the Church," see AVIGNON.

Babylonian Literature. See LITERATURE.

Bacchus, or **Dionysus,** the Greek god of wine. The name Bacchus was originally the god Dionysus, but came to be used alone by both Greeks and Romans, and is the name by which the wine god is known usually. There are many perplexing stories in regard to this god. His worship appears to have been more or less identified with that of Apollo, while some authorities claim that the Phoenicians introduced the worship of Dionysus as a tauriform sun god into Greece. However, it is certain that he was most venerated in his character of wine-god, and in him was worshiped the fruitfulness of the vine and also the generative power in nature.

Dionysus, in the Greek myth, was the son of Zeus and Semele, daughter of Cadmus. Hera, jealous of Semele, disguised herself as an old woman, and persuaded Semele to request Zeus to show himself to her in all his glory. Semele made Zeus promise to grant her any request she might make. Before he could check the words upon her lips she asked to see him in his splendid array, as he appeared in heaven. Zeus sadly consented. He appeared to her only in his "lesser panoply," but this was too much for mortal vision and the fires of his glory consumed Semele. The infant Bacchus, however, was saved, for cool ivy sprang up about him, protecting him from the radiance. Then he was intrusted to Hermes, who carried him to Nysa in India, where the Nysaean nymphs cared for him. Thus he received his name of Dionysus, or god of Nysa. When grown to a beautiful youth, he invented a beverage from grapes and traveled through the whole world, teaching the cultivation of the vine and the manufacture of wine. Where he was welcomed and treated with hospitality, the people were rewarded. If he was ill treated they were punished.

This journey is represented as a march of triumph. The god rode in a chariot drawn by lions or panthers, and was accompanied by Silenus, his foster father, the god Pan, and a host of men, women, and satyrs, who, crowned with ivy, and

brandishing the thyrsus, a rod twined with ivy, danced around him, singing and shouting. When he reached Thebes, his birthplace, his divinity was denied. Bacchus inspired the women with a fury which drove them forth to join his followers, but Pentheus, the king, took arms against him. Now Pentheus' mother, Agave, was among the revelers. Bacchus caused her son to appear to her in the form of a wild beast. Gathering her companions to her aid she rushed upon Pentheus and slew him. On the way to Naxos, Bacchus fell into the hands of a band of sailors who took him for a king's son on account of his purple robe and attempted to carry him away. They fettered him, but his bonds fell off. Ivy grew up about the ship in midocean and stopped its progress. The sailors went mad and sprang into the sea, where they became dolphins. On the island of Naxos, Bacchus found and married Ariadne, who became thenceforth immortal. Bacchus descended into Hades, found Semele and led her to Olympus, where she too became immortal. In the terrible war with the giants, Bacchus proved a great fighter and saved the gods from ruin. Zeus greeted him with cries of "Evan, evoe," "Well done, my son," which words were afterward used as a salutation to Bacchus.

In Boeotia, the god was associated with a great number of incidents, and here was the chief seat of his worship, whence it spread to other parts of Greece, to Asia Minor, and to Italy. As the productiveness of nature was worshiped in Bacchus, it was natural to observe in connection with him the decay of vegetation in autumn and its revival in spring. So yearly Bacchus was supposed to be slain, to descend to the lower world, and to return again. This is doubtless the myth which connected his worship with that of Apollo. For the most part the worship of Bacchus was connected with the wildest orgies, which lasted several days and nights. The days were given up to musical and dramatic entertainments, the nights to feasting and revels. The procession was an important part of the celebration, commemorating Dionysus' triumphal march from India. The Bacchanalia or Dionysia, as these festivals were called, seem to have been celebrated in Attica with peculiar solemnity, and to have reached their highest expression in the choragic literary contests, for which were written most of the masterpieces of the Grecian poets.

In early art, Bacchus is represented as a bearded man of full age, the figure completely draped. Frequently he has small horns on his head, a symbol of force. The thyrsus rod and the drinking cup are his symbols, and, among animals, the bull, goat, lion, and panther. This representation is called the "Indian Bacchus," because it was supposed to have originated in India. Other authorities claim that the beard was given him in Lydia. In later art, Bacchus is a beautiful, black-eyed boy, his golden hair crowned with ivy, the figure very lightly draped with a purple robe or a panther's skin. Sometimes, too, he is represented as an infant.

In the noted palace of the Borghese (bor-gā′se) family at Rome, there is a famous statue of Bacchus with a bunch of grapes in his hand and a panther at his feet.

Bacchus that first from out the purple grape
Crushed the sweet poison of misused wine.
—Milton.

Bach, bäk, **Johann Sebastian** (1685-1750), a celebrated German musician. He was born at Eisenach. A soprano choir singer, court organist, and director of concerts at Weimar, in 1723 he became cantor to St. Thomas' School at Leipsic. Bach was a noted composer and organist. His compositions are too difficult to be popular; but in reputation and merit he has no rival unless it be Handel. Bach played before Frederick the Great at Potsdam, and was appreciated by musical circles throughout Europe. Bach was a skillful pianist. He is credited with having taught the modern method of tuning pianos, and the method of playing by which all the fingers are used. He was a beautiful singer, but lost his voice while a young man. The Bach family is decidedly musical. Ancestors and descendants of Sebastian to the number of not less than 120 have been organists in cathedrals.

See ORGAN.

Bacheller, Addison Irving (1859-), an American novelist and journalist, was born in New York state. He was educated at St. Lawrence University. He began his career as journalist on the *Brooklyn Times*. He has written a number of novels, among which are *Eben Holden, D'ri and I, The Man for the Ages* and *In the Days of Poor Richard*.

Bachelor's Degree, an old academic distinction, the significance of which has varied in different countries. In the fifteenth century it was looked upon as a minor degree. Generally, it has been bestowed at the end of the first stage in a liberal education, and the recipient is supposed to be versed in certain fundamental branches.

The original form of the degree was Bachelor of Arts (B.A.), and it is usually essential that the taking of this degree should precede that of Master of Arts or Doctor of Philosophy. In the United States there is the degree of Bachelor of Law (L.L.B. or B.L.), Bachelor of Divinity (B.D. or S.T.B.), Bachelor of Medicine, (M.B.), etc. The schools of science have given the degree of Bachelor of Philosophy (as at Yale, since 1852); Bachelor of Science (as at Harvard, since 1851), and the degree of Bachelor of Letters is conferred on those who have specialized in modern literature. This latter distinction, however, is growing rare,

Bacillus. See BACTERIUM.

Backgammon, a game played with dice, men, and a board. The board is marked off into four quarters or tables, each containing six points, corresponding to the six spots of the dice. The first or entering table may be at either player's left hand, the home table at either player's right. The points are counted from left to right in that half of the board containing the entering table, from right to left in the other half, although the men of both players move in the same direction throughout the game. Thus the last point a man may reach is point one of the home table. The players sit opposite each other, one having fifteen black men, the other as many white. The players take turns in throwing the dice. The player places men on the points, or moves them forward from point to point, according to the spots thrown with the dice. If, for instance, he throws a one and a four, he places a man on the first point and another on the fourth point of the first quarter. As soon as his men are all on, he begins to move them forward. A throw of a two and a three, for instance, authorizes a player to move one man two points forward and another three. If doubles are thrown, the player doubles his play. That is, if he throws two fours, he has the right to play four fours. He may then play the "opposites" or four threes. In addition he has the privilege of a second throw. Under the rules of the game a man occupying a point alone may be removed from the board at any time that the opponent is authorized to occupy the position, in which case it must make the journey anew. A man that has been thrown off by one's opponent must be replaced before any moves can be taken. A point defended by two or more men may not be occupied by one's adversary. In the last quarter the men may be removed, or "thrown off" instead of moved forward. For instance, if five and four be thrown, a man may be thrown from point five and one from point four. If the proper point contains no men, and none stand on a higher point, the player may "throw off" from the next lower point that contains men. He wins the game whose men make the journey from the first quarter or table to the last and are thrown off before his opponent's. The game is largely one of chance, but skill may be acquired in blocking the progress of one's opponent, while still advancing one's own men. The origin of the name is unknown. The probabilities are, however, that the word is of Anglo-Saxon origin, meaning "back game," or a game in which the men are likely to be sent back. The game originated, it is thought, in the tenth century. Backgammon is mentioned by Chaucer, and has always been regarded as a reputable game.

Bacon, Francis (1561-1626), an English statesman, philosopher, and man of

letters. He was well born. He was educated at the University of Cambridge, and was privileged to travel abroad, particularly in France. In the reign of Queen Elizabeth and James I, he was a member of Parliament, and rose to high position. In Parliament he spoke so well, says Ben Jonson, that "the fear of every man that heard him was that he should make an end." In 1617 he was lord keeper of the seal, and in the next year was made lord high-chancellor. He was created Baron Verulam and Viscount St. Albans. In spite of his position, liberal salary, and honors, extravagance led him into doubtful practices. He was accused before the House of Lords of receiving money for appointments to office, and for grants of trade privileges. He acknowledged his guilt and was sentenced to pay a fine of $200,000 and to be imprisoned in the tower during the pleasure of the king. He was soon released, but he was ever after disqualified to hold public office. Bacon claimed that though he had accepted money he had not allowed it to influence him. His friends claimed that his punishment was prompted by Puritan zeal and partisanship.

Bacon possessed a brilliant and powerful mind. He lived in a day when scientific notions were crude. He fell into grievous errors, holding that the sun revolves about the earth, etc., but he was a close student of literature, of men, and of nature. He protested against traditional authority in science. In the history of the development of science, he is regarded as one of the earliest and foremost advocates of the principle that accurate scientific knowledge is to be obtained, not from men and not from books, but from nature. He was an advocate of experimental science, and held views which have ripened into the laboratory of the school and college. "We should not," said he, "like the spiders, which draw their threads from themselves, derive our ideas merely from ourselves; nor should we, like the ants, merely collect; but we should, like the bees, collect and elaborate." Much of his writing was done in Latin, then the language of the learned. He is said to have got his death from a cold caught in packing a fowl in snow, to see whether it would keep or not. Here we have the germ of the refrigerator.

Although we have seen that Bacon himself was not proof against temptation, and that he was far from an honest man, his *Civil and Moral Essays* are by far his best work, and constitute his strongest claim to remembrance. His essays *Of Truth, Of Revenge, Of Envy, Of Travel, Of Great Place, Of Dispatch, Of Friendship, Of Expense, Of Ambition, Of Usury, Of Vainglory,* and others are unsurpassed. He seems to know how to fortify others where he himself was weak. To give his valuable sayings would be to quote his essays entire. A few sentences must serve as examples:

Studies serve for delight, or ornament, and for ability.

Crafty men contemn studies, simple men admire them, and wise men use them.

Some books are to be tasted, others to be swallowed, and some few to be chewed and digested.

Reading maketh a full man, conference a ready man, and writing an exact man.

No pleasure is comparable to the standing upon the vantage-ground of truth.

Prosperity is not without many fears and distastes; and adversity is not without comforts and hopes.

The remedy is worse than the disease.

Chiefly the mould of a man's fortune is in his own hands.

Virtue is like a rich stone,—best plain set.

God Almighty first planted a garden.

SAID OF BACON.

Next to Shakespeare the greatest name of the Elizabethan Age is that of Bacon.

He had the sound, distinct, comprehensive knowledge of Aristotle, with all the beautiful lights, graces, and embellishments of Cicero.—Addison.

The great secretary of nature and all learning.—Walton.

If parts allure thee, think how Bacon shined,
The wisest, brightest, meanest of mankind.
—Pope.

To ordinary eyes the Chancellor was at the summit of human success. Jonson had just sung of him as one "whose even thread the Fates spin round and full out of their choicest and their whitest wool," when the storm burst. The Commons charged Bacon with corruption in the exercise of his office. It had been customary among

Chancellors to receive gifts from successful suitors after their suit was ended. Bacon, it is certain, had taken such gifts from men whose suits were still unsettled; and though his judgment may have been unaffected by them, the fact of their reception left him with no valid defence. He at once pleaded guilty to the charge. "I do plainly and ingenuously confess that I am guilty of corruption, and do renounce all defence." "I beseech your Lordships," he added, "to be merciful to a broken reed." The heavy fine imposed on him was remitted by the Crown; but the Great Seal was taken from him, and he was declared incapable of holding office in the State or of sitting in Parliament. Bacon's fall restored him to that position of real greatness from which his ambition had so long torn him away. "My conceit of his person," said Ben Jonson, "was never increased towards him by his place or honours. But I have and do reverence him for his greatness that was only proper to himself, in that he seemed to me ever by his work one of the greatest men, and most worthy of admiration, that had been in many ages. In his adversity I ever prayed that God would give him strength: for greatness he could not want." His intellectual activity was never more conspicuous than in the last four years of his life. He had presented "Novum Organum" to James in the year before his fall; in the year after it he produced his "Natural and Experimental History." He began a digest of the laws, and a "History of England under the Tudors," revised and expanded his "Essays," dictated a jest book, and busied himself with experiments in physics. It was while studying the effect of cold in preventing animal putrefaction that he stopped his coach to stuff a fowl with snow and caught the fever which ended in his death.—John R. Green, *Short History of the English People.*

Bacon, Mrs. Josephine Dodge Daskam (1876-), an American writer. She was born in Stamford, Connecticut, and received her education at Smith College. She is a writer of popular short stories for the magazines. She excels in stories about children. *The Imp and the Angel* is natural, amusing, and, in parts, beautiful. Other books from her pen are *Smith College Stories, A Sister's Vocation.* Among her most recent books are *The Open Market, While Caroline was Growing, On Our Hill,* and *Square Peggy.* She has also compiled *Best Nonsense Verse.*

Bacon, Nathaniel (1647-1676), a leader of the Virginian colonists. He was a native of Suffolk, England. He was a distant relative of Francis Bacon. He was well born and well educated, but emigrated to Virginia in a spirit of adventure. Here he became a member of the governor's council, and an especial champion of the cause of the common people. Affairs were not going well in the colony. Charles II had granted Virginia to two worthless favorites, the Earl of Arlington and Lord Culpepper. Their agents were demanding payment for land from all settlers who could not show perfect title. Berkeley, the governor, was an aristocrat. He had no sympathy with the settlers. He had not called for the election of a new assembly in thirteen years. The assembly that held over transacted business to his liking, and he did not want a new element to get control. The vestries, the governing boards of the various parish churches, had become self-elective bodies, "close corporations." To add to their grievances, the settlers were harassed by the Indians. Cabins were set on fire at night, and the inhabitants were massacred, scalped, or carried into capitivity. Berkeley was carrying on a profitable trade through agents with the Indians, and appeared to be indifferent. He levied taxes of 2,000 pounds of tobacco for the building of forts, and allowed his officials to embezzle the proceeds. The atrocities of the Indians and the stubborn refusal of the government to take measures for the protection of the settlers became so exasperating that the people rose in revolt under Bacon, and proceeded to chastise the Indians. They then refused to lay down their arms until the governor should issue a proclamation of amnesty. A new election was called. Bacon was chosen a member. The new assembly widened the suffrage, gave the freemen of each parish the right to choose the vestries, and made other changes of a popular nature. Under pressure, Governor Berkeley not only pardoned Bacon, but promised him a commission to raise a volunteer army. Bacon suspected that the governor was planning to arrest him. He left Jamestown secretly but came back at the head of 500 men. Berkeley proclaimed him a rebel. Bacon's forces besieged Jamestown and reduced it to ashes. In the midst of their altercations Bacon died of a fever. Many of the popular leaders were executed

erful electric light is as unfavorable. So-called X-rays are without effect. Of the solar rays green and violet are most fatal.

Bacteria of various kinds are found in air, in dust, in soil nine feet deep, in rain, in snow, in ice, in the water of wells and cisterns, and in the ocean, lakes, and rivers. It is difficult to get artesian water free from bacteria. They are numerous in ponds and pools containing decaying weeds or grass. They fairly swarm in water contaminated by sewage. Rotting or decaying animal or vegetable matter of every description is, as we shall see, full of bacteria. Sour milk, rancid butter, ripening cheese, decaying fruit, everything that is undergoing fermentation or putrefaction, thoroughly advertises the presence of bacteria. When we say of an article of food that it is spoiling, the chances are that bacteria are destroying it.

All bacteria live by absorbing material. A bacterium coming into contact with food suited to it, soaks in food and splits into bacteria that soak in more food and split as before. For the present purpose it is sufficient to say that bacteria feed on animal and vegetable matter. Some sorts feed on dead plants, others draw on living plants. Some feed on living animals. Comparatively few live on live plant or live animal tissue. Not all decay is due to bacteria. Chemical decomposition may take place from a variety of reasons; but in ninety-nine cases out of a hundred the rotting animal or vegetable substance is simply giving way to bacteria. We can fruit "to keep it from the air," in reality to keep bacteria out of it. We dry beef "to keep it," in reality to render it so dry and hard that bacteria cannot get a foothold. We put specimens in alcohol and formalin not only to keep them moist, but because bacteria cannot live in these liquids. We silo our cornfodder to keep bacteria out of it.

Bacteria in their right place are exceedingly useful, indeed indispensable. Straw and all that class of dressing for land, known as stable manure, would be useless, a mere incumbrance in the fields, were it not that bacteria attack it vigorously and break it up and rot it into material suitable for plant food. What we call plants, at all events field crops, would not grow, were it not that countless myriads of bacteria have manufactured plant food ready for absorption by their roots. When one passes rank grass or luxuriant vegetation anywhere, he may know that the roots of the plants are feeding where scavenger bacteria have at some time prepared food for them. Unless plants were returned to the earth and then worked over by bacteria, rank plant growth would soon use up about all the plant food available, and immense tracts now fertile would become barren. Plant life needs the help of bacteria to work over plant and animal material so that it can be used for plant food again. Animals eat plants and other animals, but plants live on air, water, and soil. Ordinarily speaking, plants cannot use old plant and animal material till it has been reduced by bacteria to soil.

Bacteria are indispensable in the arts. The retting of flax, jute, hemp, and cocoanut fiber is brought about by the action of bacteria. The gums are dissolved, leaving the fibers free. Sponges, dripping from the sea, are piled up to rot; this is to allow bacteria to consume the animal portion. Vinegar cannot be made without bacteria. The curing of tobacco is the work of bacteria. The ripening of cream and the maturing of cheese are due to bacterial action. If not allowed to go too far, butter is improved by bacteria. Nitrogen-producing bacteria, living in colonies on the roots of clover, enrich the soil. Bacteria are the great enemies of plants and animals, but they are also indispensable. We need to know how to derive profit from useful bacteria, and how to prevent harmful bacteria from doing damage.

In making war on dirt and dust, the housekeeper is fighting bacteria. Repeated examinations show that the air of a city is full of them. A greater number are found near the ground than at an elevation. Anything which raises dust increases the number of bacteria in the air. Flies carry bacteria about on their feet; bees among their hairs, and birds among their feathers. Wherever dust can lodge,

there are bacteria. They flourish in dirt and filth. They cannot multiply unless moisture is present, together with some organic substance.

The modern physiologies give generous space to the subject of bacteria. Bacteria cling to the surface of the body, to clothing, under the finger nails, in the hair, in crevices or cracks of the skin. The bodies of animals and of man contain them in the mouth, stomach, and intestines; but they are never in the blood, in the muscles, glands, or any other organ or cells in the body of a healthy animal or person. There are invariably six kinds of bacteria in the mouth, although from eight to twenty-two different kinds are often found. Inflammation and soreness of the gum is usually due to the spiral bacteria of the mouth. Bacteria are, also, the cause of the decay of the dentine of the teeth. For this reason, it is highly important that the hard enamel covering of teeth be kept intact. Painful ulcers and abscesses of the roots are also caused by the activity of mouth bacteria. Mouth bacteria also give rise to a kind of poison called ptomaine. It is these ptomaine-producing bacteria that are dangerous when the skin is broken by the bite of a dog or other animal, or by the bite of a human being. They are feared by physicians almost as much as the hydrophobia bacilli of the mad dog.

In the mouth, stomach, and intestines, certain bacteria aid in digestion of foods by producing a substance called an enzyme which breaks up and liquefies solid foods, like the white of egg, and meats, and even the hard parts of vegetables.

Peculiar bacteria, to which we now come, live by breaking down the cells of living plants and animals. A living animal is made up of cells. Bones are composed of cells that are all hardened wall, no contents, we might say. The softer the part of the body, the more liquid the cell contents. Most bacteria, as we have said, are powerless to attack life. We eat, drink, and breathe them without knowing or needing to know it. But there are a few bacteria or microbes or bacilli, as we choose to call them, that attack living cells with energy,—bacteria whose presence is dangerous. It is one of the most marvelous discoveries of the nineteenth century that many fatal diseases are due to nothing more nor less than the presence of immense colonies of bacteria that turn the sick person's body into waste until death ensues. It is thought quite possible that a person in perfect health and spirits can not be taken possession of by any of these bacteria, but there are few persons who are not liable, at some time, or in some weak spot, to be seized by one disease or another.

It is the theory of modern medicine that each contagious or infectious disease is the working of some particular bacterium peculiar to that disease. Consumption, or tuberculosis, as it is called more accurately, is the work of a kind of bacterium that breaks down the cells of the lungs. The dread bacteria of leprosy attack a person's extremities and literally consume their victims inch by inch. The list of diseases caused by bacteria is not short. The bacteria of disease are usually, but not always, of the rod-shaped group called bacilli in the plural and bacillus in the singular. We have accordingly the bacillus of pneumonia, the bacillus of tuberculosis, of leprosy, of glanders, of lockjaw, of syphilis, of typhoid fever, of dysentery, of diphtheria, of ulcers, of the bubonic plague, and of other diseases. The bacterium of cholera is a peculiar member of the spiral group. To say that a disease is contagious is to say that the bacilli of one person are likely to be transferred to another person and reëstablish themselves in dangerous numbers.

Fortunately the membranes covering all parts of the human body, inside as well as outside, are not suitable lodging places, hosts, we say, for bacteria. The bacterium of disease needs to come in contact with fresh, living cells to gain a hold. The disagreeable pus that is found in wounds is a bacterial product. If a cut or wound be made without introducing bacteria and bacteria be kept out, no pus can form. Surgeons sterilize their instruments, boil them, wash their hands in hot water, use sterilized towels and lint, and even refrain from breathing into an incision lest bac-

teria be introduced. If bacteria be kept out, a cleanly cut will heal rapidly without ulceration or inflammation. It is not the surgeon's knife that is to be feared, but the bacteria.

A large part of modern medicine consists in efforts to prevent disease, to protect people from bacteria. Boards of health guard our water supply that we may not drink typhoid germs. Streets and alleys are ordered cleaned that they may not breed fever bacilli. Cleanliness is one of the laws of health. The cure of contagious diseases is sought by establishing conditions under which the bacillus ceases to thrive and degenerates or disappears from the system. See SERUM, THERAPY.

Baden, a province of the present Germany. It is a country of irregular shape and width extending along the eastern bank of the Rhine from a point below Mannheim to Lake Constance. Its area is 5,823 square miles with a population of 2,010,728, or 345 to the square mile. Approximately one-third of the people are Protestant, the rest are Catholics. The archbishop resides at Freiburg. The Gothic cathedral built of red sandstone is considered one of the most beautiful examples of architectural art in Germany. The largest city is Mannheim.

The chief commercial city, Mannheim, is situated at the head of regular navigation on the Rhine. Heidelberg, just above, is the seat of the university of that name, and is noted for the ivy-clad remains of Heidelberg Castle, the most impressive ruins of the sort in Europe. The buildings face the castle yard, and include the finest example of Renaissance architecture in Germany. They divide the visitor's attention with a cellar at one corner containing the famous Heidelberg Tun, a monster wine cask. It is the largest in the world, and is capable of holding 49,000 gallons. The university has been one of the most renowned in all Europe. Melanchthon, Helmholtz, and Bunsen were professors here. It still has a large library and an able faculty. Many American scholars have studied at Heidelberg.

Carlsruhe, meaning Charles' rest, is the capital of the province. The castle of the former ruler, who was called a grand duke instead of a king, stands in the center of the city. Streets radiate from it in fan fashion in all directions. There are a number of beautiful buildings, including a parliament house, a palace, and a town hall. There are several valuable museums, including an unrivaled collection of birds and a gallery of paintings.

The warm springs of Baden-Baden have been noted since the time of the Romans. There are thirteen springs having a temperature of from 130° to 150° F. Baden is, of course, the German word for baths. The compound Baden-Baden is used like our New York, N. Y., to distinguish it from the Baden near Vienna and that in Switzerland. It is a town of 15,000 people. There are several hotels, pleasure gardens, and other fashionable attractions. It is a noted watering place. The season lasts from May until October, but is at its height in August, when there are about 40,000 visitors. The gaming tables once maintained here have been driven away to Monte Carlo.

The surface of Baden is for the most part hilly. There are mines of coal, salt, iron, zinc, and nickel, and many mineral springs. About half the country is under cultivation; the rest is devoted to forests, meadows, and pastures. The people live in villages. The farms are small. They are devoted to the production of wheat, oats, barley, rye, hemp, tobacco, and sugar beets. The valleys of the Rhine and Neckar are noted for the production of wine.

A large part of the famous Black Forest lies in Baden. Wooden toys, musical boxes, carved deer, inlaid tables, and the famous cuckoo clocks are made here. Canary birds are reared by the people of the Black Forest for export to all parts of the world. It is a region of shady, macadamized roads, picturesque villages, cool drinking fountains, and quaint, hospitable inns,—an ideal country through which to travel on a bicycle. Its railroads are owned and operated chiefly by the state.

See GERMANY.

Baden-Powell, Robert Stevenson Smith (1857-), a British general, and founder of the Boy Scouts. Entering the

army in 1876, he served with distinction in India, Afghanistan and South Africa. During the South African War, he won signal distinction through his defense of Mafeking, Cape Province, through a siege of seven months by a superior Boer force. In 1900, he was made chief of the South African Constabulary. Through all of his military career he manifested keen interest in the welfare of boys, and to him goes the honor of having founded the Boy Scout Organization in 1908. His works include *Reconnaissance and Scouting, Scouting for Boys, My World Tour.*

Badger, a flat-footed, flesh-eating, burrowing animal allied to the skunk and weasel. The family is widely distributed. Species are found in Europe, India, Japan, South Africa, and America. The flesh is used for food. The pelt is used by furriers. The hair is in demand for shaving brushes and artists' pencils. The European species burrows in banks and copses. Badger hunting is a standard sport in the border countries of Great Britain.

The American badger is an animal of the prairie and plain. It ranged formerly throughout the Mississippi Valley and westward to Central Mexico and the Pacific Coast. It is now rarely found east of the Mississippi. It has a sharp nose, a broad, flat body, short legs, and large claws. It lives in burrows of its own construction, emerging at night to hunt gophers, mice, eggs of ground birds, and even reptiles and insects. If caught by chance in the open during the day time, it tucks its head and feet under its body and lies so flat as to be mistaken easily for a hillock of earth. It is dormant in winter.

Badger State. See WISCONSIN.

Bad Lands, certain regions in the West remarkable for the way in which the country has been cut into gullies, leaving tables, pinnacles, and cliffs, often of fantastic shape and considerable height. Pillars of hard clap capped by sandstone are of typical occurrence. The cutting has been done by water, but, through lack of rain, the face of the country is now undergoing change very slowly. The principal areas that go by that name lie in Wyoming and western Dakota. The Bad Lands of the Cheyenne and White rivers are perhaps the most remarkable. The traveler going westward on the Northern Pacific enters the Bad Lands shortly before reaching Medora. Theodore Roosevelt lived here for some time. He gives a vivid account of the Bad Lands in his *Ranching in the Far West.*

We make room for a few extracts from a very interesting account of the Bad Lands of South Dakota written by Mr. N. H. Barton for *Scribner's Magazine:*

Among the most notable but least known wonders of our far west are the Big Bad Lands of South Dakota. They are a portion of the great central plains lying east of the Black Hills, and are remote from settlements and lines of communication. They are rarely reached by sightseers and the great tides of transcontinental travel sweep far to the north and south. The region has long been famous as a collecting ground for students in quest of fossil bones, and thousands of fine specimens have been obtained for museums in all parts of the world. The bad lands do not present mountains or chasms, woodlands or meadows, but a wilderness of rugged forms of moderate height carved in soft light-colored rock. There is endless variety in the configuration and the spectacle is a wonderful one, as it lies glittering in the bright western sunlight. Most of the surface is bare of vegetation, and as the area is several thousand square miles, the panorama stretches as far as the eye can reach.

There are walls and pinnacles, ridges and towers, carved by the rain and wind-blown sand into forms of great beauty and endless variety. Viewed from high points much of the region presents the aspect of a great ruined city of antiquity, built of materials of pale tints of pink, cream, buff, and green. Great castles with buttressed walls, pinnacles and towers abound, but crumbling and broken and in confusion of arrangement. High bare walls extend for miles, notched with amphithedral alcoves and sustained by elaborate buttresses. The highest features rise from 250 to 500 feet above the valleys. Many deep canyons extend into the bad lands which are walled by precipitous cliffs presenting innumerable grotesque forms that change with the point of view.

Originally the entire region of the present Big Bad Lands was a relatively smooth plain built of thick sheets of sand and sandy clay deposited by ancient rivers of Tertiary times flowing from the west. The bedding of the soft fine-grained sandstone usually is plainly visible in horizontal banding of many delicate shades. Occasional beds of coarse materials mark the course of a strong current of some old river. In recent geologic time, as the geologist views chronology, this region was uplifted as a high plateau, and White River and

the south fork of Cheyenne River and their branches began cutting deeply into the surface of the plains. Although the streams appear to be insufficient to erode extensively, the rain which falls in spring and early summer comes not in gentle showers but as a typical western cloudburst, and the torrents that then flood the gullies and the valleys continue the erosion that developed this great area of bad lands. The steep declivity and the softness of the massive sandstone are exceedingly favorable conditions for rapid erosion.

Baedeker, bād′ĕk-er, **Carl** (1801-1859), a Leipsic publisher. He is the originator of a celebrated series of guide books still published in his name. The various volumes describe London, Norway and Sweden, Paris, Switzerland, Central Italy, the Rhine, Lower Egypt, etc. They are printed on thin paper with flexible red binding recognizable at a glance. The traveler armed with a "Baedeker" has a mine of information relative to expense, routes of traveling, location of restaurants, hotels, walks, bridle paths, bicycle roads, plans of cities, cab fares, omnibus lines, museums, galleries, excursions, boat routes, scenery, antiquities, industries, and a thousand and one points of information that save asking questions. While indispensable to the traveler, they are most valuable volumes also for a school library.

Baffin Bay, a shallow Arctic gulf or passage, lying between Greenland and the ice covered islands of northeastern America. Its greatest width is about 500 miles. It was discovered by navigators in 1616, who hoped to find a passage through it to the Pacific. This sea was the favorite resort of whalers and seal catchers for more than two centuries. These animals are of late becoming too scarce for profitable pursuit. The sea is closed to navigation by ice during the greater part of the year. This, however, affords little cause for regret as there can be no occasion for its ever becoming a pathway of commerce.

Baffin, William, an English navigator and writer. The date of his birth is not known. He was killed in 1622 in a fight with the Portuguese on an island in the Persian Gulf. He was pilot of the "good ship Discovery," which, in 1615, tried to find the Northwest Passage. On his return, Baffin wrote an account of the voyage. The original manuscript is preserved in the British Museum. The "Discovery" was the earliest English ship to visit the broad expanse between Greenland and British America. The name of the navigator has been preserved in Baffin Bay and Baffin Land.

Bagatelle, literally a small bag or bundle, hence a trifle or thing of no importance. In literature the term is used to denote a plaything or a matter of little consequence. The game called bagatelle is played on a table with nine holes arranged at one end in the form of a diamond. Billiard balls are played up the table with a cue into these holes. The player who is most skillful in lodging his balls in the holes of greatest value wins.

Bagdad, in Arabia, formerly the capital of the Turkish province of Bagdad. The city was founded in 762 by the Arabs. It is in the latitude of Los Angeles. Old Bagdad lay on the west bank of the Tigris. Under the rule of Haroun-al-Raschid it became the center of caravan traffic in the oriental world, and, a little later, 2,000,000 people—officeholders, merchants, artificers, servants, and rabble—are said to have crowded within its walls. The modern city lies on the east bank. The two parts are connected by a pontoon bridge resting on thirty boats and guarded by a citadel. The crooked streets are so narrow that two horsemen can hardly ride abreast. They are filled with all sorts of garbage, dead animals, and fighting dogs. The houses are one-story brick buildings with flat roofs.

Windows and doors open on inner courts, so that, save for gates, wayfarers pick their way between continuous brick walls as repulsive as the streets themselves. The interiors of the better houses have vaulted ceilings and are decorated with gilded moldings, inlaid mirrors, etc., suggestive of former wealth. The present population is estimated at 145,000. Three-fourths of the people are Turks. The rest are chiefly Arabs, Persians, Hindus, and Jews.

In summer the heat is oppressive, ranging from 75° F. at sunrise to 120° F. at noon. During the rainless summer the

entire population sleeps on the house-tops. The bazaars are composed of numerous shopkeepers' stalls facing a common avenue and under a common roof of vaulted tiles or even of straw. There are fifty baths. From the outside the city is well nigh hid by a green canopy of palm trees, through which the brightly colored domes and minarets of a hundred mosques gleam with picturesque effect. Commerce with London is maintained by way of the Tigris and the Suez canal. Wheat, wool, gum, galls, dates, and oriental rugs are exported. A considerable caravan trade is still carried on with Persia and with Mediterranean ports. A railway to Constantinople is partly built and in operation. For glimpses of old Bagdad, read *Arabian Nights*.

See HARUN-AL-RASHID; ARABIAN NIGHTS.

The city was built with great bricks, and surrounded by a wall a hundred and twenty feet high; at a good distance without this wall rose a second, guarded by mighty bastions, and surrounded by a moat which could be filled with water at pleasure. The city was entered by four massive iron gates through which could ride horsemen with upright lances, and each of which required four men to stir it. On each was a gilded dome, where commissioned troops were on constant watch. Within the double walls was an open space, surrounded by arcades, which served as barracks for the troops of the palace garden. Beyond the arcades and another open space and another gateway, stood the palace of the caliph and the chief mosque.

A hundred feet was fixed for the breadth of the chief, and thirty feet for that of the side streets. In the suburbs were great tracts of cultivated land and beautiful gardens, watered by countless canals from the Tigris and Euphrates. The most beautiful of these plantations were full of vines and citron trees.

On the western bank of the Tigris rose a royal castle, towering over all that part of the city with its walls, its balconies, and domes. Out of the sea of houses rose countless minarets into the air, among them the famous "green" minaret, covered with shining green tiles. Here, too, was the great "green dome," a hundred and sixty feet in height.

On the western bank of the Tigris were palaces, baths, mosques, bazaars, and among these splendid buildings lay a confused labyrinth of the poor houses of the lower classes. The bazaars were rich with the wares of Asia, and one was especially famous for its costly profusion of Chinese silks.

The palace of the caliph was set in the midst of large and well-kept gardens, and surrounded by countless courts, open halls, balconies, kiosks, all most richly adorned by splendid carpets and divans, with gold-embroidered curtains and rich vases of gold and silver, or Chinese porcelain. In the gardens bloomed the finest plants of Asia; within the inner chambers were richly clad and handsome slaves, who lived as befitted the servants of a prince.

Our picture would be incomplete without a visit to the quays, which stretched for miles on either shore of the river. Whole fleets were here at anchor, sea and river boats of all sizes, from the Chinese junk to the awkward old Assyrian rafts. There, too, were anchored countless ships of war, and between these lay the pleasure-boats of the caliphs and the nobles, glittering in gold and brilliant colors.—Kremer, *Description of Bagdad in Time of Haroun-al-Raschid.*

Bagehot, băg′ŭt or baj′ŭt, **Walter** (1826-1877), an English journalist. He was born and died in Langport, Somersetshire. His education was received at the University of London. Although he studied law he did not practice, but joined his father in banking, and soon became known as a writer on economic subjects. He was for nine years associate editor of the *National Review*, and from 1860 until his death was editor and joint proprietor of *The Economist*. He wrote on biographical, literary and theological, as well as on economic subjects, and published several books, among them, *Physics and Politics, The English Constitution,* and three volumes entitled *Literary Studies, Economic Studies,* and *Biographical Studies.*

Bagpipe, a wind instrument much beloved in the Highlands of Scotland. It consists of a leathern wind bag, three reed drones, a reed chanter, and a valved mouth tube. The drones are tubes of unequal length. Two of them are short and are intended to be an octave higher than the other. The chanter is constructed like a German flute with openings to be played by the fingers. The performer carries the bag under his arm, forces out air through the chanter with his elbow and at the same time keeps up a supply of air by forcing his breath in through the mouth tube. In range the instrument comprises but nine notes, or the natural scale, and an additional note an octave lower. The player, however, introduces an infinite variety of rapid quavers, resulting in a skirling and

droning that must be heard to be appreciated.

It was believed currently at one time that the bagpipe was invented in Scotland. This was an error. We learn from inscriptions that a similar instrument was in common use among the Egyptians, the Greeks, and the Romans. Chaucer speaks of his Miller as skilled in playing the bagpipe. Shakespeare alludes to the "drone of a Lincolnshire bagpipe." In fact, the bagpipe was once common throughout Europe. It has lingered in the Highlands of Scotland after it has disappeared everywhere else, unless we except the Tyrol and certain districts of Ireland.

The bagpipe is the national instrument of Scotland. It is played at marriages, feasts, and funerals. The piper celebrates the birth of an heir; and he marches proudly in front of his clan on all state occasions. The Highland regiments in His Majesty's service are always accompanied by native pipers. Many a gallant charge has been made, and many a fortress taken, to the thrilling notes of the bagpipe.

Whittier compares skillfully the notes of the bagpipe in their Highland home with those heard at the head of a Highland regiment in India:

Pipes of the misty moorlands,
  Voice of the glens and hills;
The droning of the torrents,
  The treble of the rills! . . .

Dear to the Lowland reaper,
  And plaided mountaineer,—
To the cottage and the castle
  The Scottish pipes are dear;—

Sweet sounds the ancient pibroch
  O'er mountain, loch, and glade;
But the sweetest of all music
  The pipes at Lucknow played.

Bagstock, Joey, a friend of Mr. Dombey's in Dickens' novel, *Dombey and Son.* He is described as "a single gentleman, to-wit, a wooden featured, blue faced Major, with his eyes starting out of his head." He is proud of his friendship with Mr. Dombey, who uses Bagstock to further his own ends. He is constantly referring to himself as "Joe B.," "J. B.," "old Joey," "old Josh Bagstock," and so forth. He is apoplectic and gluttonous, and entirely selfish. "Old Joe is hardhearted, sir," he says of himself, "he's tough, sir, tough and de-vilish sly!"

Bahamas, a group of numerous islands, keys, and reefs. They encircle the eastern end of the Gulf of Mexico in an irregular crescent 700 miles long, extending from off the coast of Florida to San Domingo. One of these islands, San Salvador, or Watling as it is now called, is thought to be the first land seen by Columbus on his first voyage of discovery, 1492. The early history of the group is not creditable to the discoverers. The natives were a simple people and were carried away by the Spaniards, in 1509, to the number, it is said, of 40,000, to work in the mines and pearl fisheries of Central America. Early English settlements were harried by the French and Spanish. The vacant islands became the resort of pirates. The present prosperity of the Bahamas dates from 1718, the date of permanent British occupation. The islands are low, well wooded, and fertile. Coral and shell limestone, mahogany, lignum vitae, ironwood, and other trees furnish an abundance of building material. The natives spun and wove cotton in the day of Columbus. Tobacco, sisal, sugar-cane, ginger, coffee, indigo, peas, potatoes, melons, gourds, and cucumbers flourish. Small fruits, oranges, lemons, pineapples, and cocoanuts are raised to advantage. Sponge fisheries are carried on along the coasts. Ambergris and pearls are collected. Salt is exported in considerable quantities. The total population of twenty inhabited islands is about 53,031 Nassau, the capital, is noted as a winter resort. The temperature for the entire year ranges only from 60° F. to 85° F. Nassau is connected by cable with the Florida mainland, and by steamer with London, Florida, and New York. American merchants do a business of about $750,000 a year with the Bahamas.

Bahia, a port of Brazil. It is situated on the fine harbor of All Saints' Bay, about 740 miles north from Rio Janeiro. Bahia was the capital of Brazil up to 1763. It is still the seat of an archbishopric. It is the capital of the state of Bahia, 164,000 square miles in extent. Bahia exports forest products, sugar, dia-

monds, and tobacco. Steamer landings average about two a day. The Brazilian Lloyds maintain a monthly steamship service with New York. The population of BAHIA is about 348,130.

Baikal, bī′käl, a lake in the south central part of Siberia. It lies in a mountainous region, 1,312 feet above the sea. It is about one-half as large as Lake Superior. It is the largest body of fresh water in Asia. R. S. Tarr gives the following figures: Area, 12,500 square miles; elevation, 1,312 feet; greatest depth, 4,550 feet. The lake is well stocked with sturgeon, salmon, and other fish. The natives also take large numbers of seals. Steep precipices or pine-clad slopes rise from its shores. The lake receives several small rivers, and discharges its waters through an outlet into the Yenisei, ultimately into the Arctic Ocean. It lies in the route of the great Siberian railway. At first, trains were carried across a distance of fifty miles or more by means of a steam ferry. In the winter a temporary track was laid on the ice. Travelers tell of riding thirty miles in open sleighs with the thermometer thirty below zero. One tourist describes the crossing as effected by means of seventy-five three-horse sleighs for first and second class passengers, and two hundred one-horse sleighs for third class passengers. A passage was maintained for the ferry as late as possible by means of a huge ice breaker. During the war with Japan, the Russian government succeeded in building a track around the south shore of the lake, thus avoiding serious delay in transportation.

Bail, in legal proceedings, security given to obtain the temporary release of a prisoner, pending the determination of his guilt or innocence. The usual method of procedure is for persons of known integrity and means to sign a bond promising to pay the state a certain sum of money in case the prisoner should fail to appear when summoned to meet the charge against him. The amount of bail is fixed by the court. The prisoner is said to "give bail." Those who sign the bond "go his bail." The design is to prevent innocent persons from being imprisoned on false or malicious charges. Were it not for bail, it would be possible for an enemy to secure a temporary and oftentimes very embarrassing imprisonment by preferring a trumped up and false charge. The law of bail is framed on the assumption that it is better to allow many guilty to go free for a time than to imprison one innocent person. The Constitution of the United States provides that excessive bail shall not be required. In the case of a charge of flagrant crime, such as murder or treason, the court may, at its discretion, refuse to admit a criminal to bail. Going one's bail is an evidence of confidence, not to say of friendship and sympathy. Horace Greeley was assailed very bitterly and unjustly for going on the bond of Jefferson Davis.

Bailey, James Montgomery. See DANBURY NEWS MAN.

Bailey, Joseph Weldon (1863-), an American statesman and United States Senator from Texas. He was born in Mississippi, but in 1885 moved to Gainesville, Texas, where he began the practice of law. He became a well-known politician in the Democratic party, and was sent to Congress in 1891 where he became leader of the minority in the House. He became Senator in 1901, and was re-elected in 1907.

Bailey, Liberty Hyde (1858-), botanist and agriculturist, well known throughout the country as a practical scientist. He was born in Michigan, educated in its schools, and graduated from the agricultural college in 1882. For one year he was associated with Asa Gray at Harvard, but returned to his alma mater as horticulturist where he remained for five years. He held the same position at Cornell for the next fifteen years, becoming the director of the college in 1903.

His greatest work is a *Cyclopedia of Agriculture* (4 vols.). Some of his other works are: *Evolution of Our Native Fruits; Beginners' Botany; Principles of Botany; Principles of Vegetable Gardening; Principles of Agriculture; Practical Garden Book; The Training of Farmers; The Apple Tree; Lessons with Plants; The Nature Study Idea; Outlook to Nature.*

Baillie, Joanna (1762-1851), a Scottish poet born on the banks of the Clyde. The greater part of her life was spent in a cottage at Hampstead, on the outskirts of London. She was a warm friend of Sir Walter Scott. We omit the particulars of not a mean literary career in order to give her *Scotch Fisherman's Song* entire:

O swiftly glides the bonny boat
Just parted from the shore,
And to the fishers' chorus-note
Soft moves the dripping oar.
Their toils are borne with lightsome cheer;
And ever may they speed,
Who feeble age and helpmates dear
And tender bairnies feed.

We cast our lines in Largo Bay;
Our nets are floating wide;
Our bonny boat, with yielding sway,
Rocks lightly on the tide.
And happy prove our daily lots
Upon the summer sea,
And blest on land our kindly cots,
Where all our treasures be!

Bainbridge, William (1774-1833), an American naval officer, a native of Princeton, New Jersey. He was connected with the payment of tribute to the dey of Algiers, and commanded the frigate Philadelphia that went aground in the war with Tripoli. He was held a prisoner until the conclusion of peace in 1805. During the War of 1812 he had the good fortune to command the Constitution in its famous fight with the Java, in which it earned the name of Old Ironsides. See OLD IRONSIDES; HOLMES.

Baird, Spencer Fullerton (1823-1887), a noted American naturalist. He was born at Reading, Connecticut. He held various positions in connection with the Smithsonian Institution, becoming its secretary in 1878. His writings on North American reptiles, birds, mammals, and fishes are standard works of reference in the department of natural history. Few men have been privileged to handle so much material new to science. Few men have had as adequate facilities, and few have done their work with equal enthusiasm and fidelity. Much credit for the success of the Smithsonian and its standing in the scientific world is due to Professor Baird. See SMITHSONIAN.

Baize, a coarse woolen fabric, with a close nap on one side. Baize is dyed usually red or green. It is used for linings, desk covers, curtains, and to fill screens and screen doors.

Bakelite, a substance which was invented by the American chemist, Dr. L. H. Baekeland, after whom it is named. It is an artificial coal tar product, and is an amber-like substance of much strength, insoluble, and which has a great resistance to heat and is characterized by its electrical insulating properties. It is used now as a substitute for celluloid and rubber, also as an enamel or finish, and as protective coating for wood and metal.

The transparent bakelite is used in the manufacture of articles for which amber was formerly used, such as pipe stems, jewelry and fancy articles. See BREAD.

Baker, Newton Diehl (1871-), an American cabinet officer, was born in Martinsburg, W. Va. He studied at Johns Hopkins and at Washington and Lee universities. He was Mayor of Cleveland (1912-16), and in 1916 became Secretary of War, and held this position until the end of the Wilson administration (1921).

Baker, Ray Stannard (1870-), an American author, editor and journalist, was born at Lansing, Mich. He was graduated from the Michigan Agricultural College in 1889, and later studied law and literature at the University of Michigan. From 1892 to 1897 he was a reporter and sub-editor for the Chicago *Record*. During 1897 and 1898 he was managing editor of *McClure's Syndicate;* from 1899 to 1905 was associate editor of *McClure's Magazine;* and from 1906 to 1915 was one of the owners and editors of the *American Magazine*. In 1919, Mr. Baker was the director of the Press Bureau of the American Commonwealth to Promote Peace, with headquarters at Paris. Mr. Baker has written extensively on social and economic questions. He is the author of *Boys' Book of Inventions, Our New Prosperity, Seen in Germany, The Spiritual Unrest.* Under the pseudonym of David Grayson he wrote *Adventures in Friendship, Contentment, The Friendly Road,* and other books.

Baker, Sir Samuel (1821-1893), an English traveler. He was a native of

London. He was educated as an engineer. In 1845 he was sent out to Ceylon to supervise the founding of an agricultural settlement and a sanitarium. Later he entered the Turkish railway service. In 1861, with Mrs. Baker, he left Cairo on a journey of exploration up the Nile. The first year he spent exploring the Blue Nile region. He then started across the country from Khartum and discovered Lake Albert Nyanza, March 14, 1864. From 1869 to 1873 he commanded an Egyptian expedition in central Africa, charged with the suppression of the slave trade and the annexation of territory to Egypt. He traveled extensively in Cyprus, Syria, and India. He wrote a number of works of more than ordinary interest, among others, *The Rifle and the Hound in Ceylon, The Albert Nyanza, The Nile Tributaries of Abyssinia, Cyprus as I Saw It in 1879,* and a book for boys, *Wild Beasts and Their Ways.* See NYANZA.

Baker's Dozen, thirteen. An English expression said to have originated from the baker's precaution of throwing in an extra bun, lest he be caught at short weight and fined heavily.

Bakersfield, Calif., the county seat of Kern Co., is situated 168 miles northwest of Los Angeles. It is an important center of the California oil industry. In and near to the city are oil wells and refineries. It has also a number of factories. Mineral deposits near the city comprise copper, gypsum, tungsten, gold and others. It has a public library, and a modern school system. The population in 1920 was 18,638.

Baking Powder, a white powder, used as a substitute for yeast. Its original composition was cream of tartar, bicarbonate of soda, and potato or rice flour. These ingredients are mixed separately and dried, and are then mixed in the desired proportions. The starch or flour keeps the soda and cream of tartar dry, and prevents their acting upon each other until ready for use. When the baking powder is wet the cream of tartar acts upon the soda and sets the carbonic acid gas free. The gas passes through the dough and makes it light and porous. Sour milk and soda answer the same purpose.

Since cream of tartar is quite expensive, this has led to the substitution of acid phosphate in some baking powders, and in some alum is used in small quantities. These substitutes, in the proportion in which they are used, are not supposed to be injurious.

Baku, bä-kōō′, a spacious Russian port and town on the west coast of the Caspian. It is in the latitude of New York City. There are numerous naphtha wells and burning springs in the vicinity. The region was at one time a favorite resort of the fire worshipers, the remains of whose temples may still be seen. Of late years Baku has become noted for the production of petroleum. About one-third of the world's product is obtained in this region. It is in the hands of foreign capitalists who pay the Russian government a royalty. Large pipes have been constructed to carry the crude petroleum to immense reservoirs and refineries. The entire business is carried on on a very large scale. There were in 1900, 1,306 wells. The yield for the year was 72,018,743 barrels of oil; 1918, 40,500,000 barrels. A pipe line leads over the mountains, through which oil is pumped to the wharves of Batoum, on the Black Sea. Baku was captured by the Turks in the Great War but later relinquished to the Allies.

Soviet forces then seized Baku and are still holding it. Oil production has fallen off greatly under the Soviets. Of Russia's total production in 1920, 25,429,600 barrels, Baku produced by far the greater part. See PETROLEUM.

There are railways which cross the country westward and northward from Baku, and others under construction to the southwest. Baku, the most important town in this district, has a population of 250,000.

Balaklava, băl-ä-klä′vä, a small fishing port in the Crimea, eight miles southeast of Sebastopol. A small British army had effected a landing here and was attacked by a superior Russian force, October 25, 1854. The Russians were beaten off and held at bay. The "charge of the light brigade" celebrated by Tennyson was a

most unfortunate but brilliant incident of the day. "Somebody blundered," but in obedience to the command, six hundred men cut their way to the Russian guns, seeing plainly that they were literally riding "into the jaws of death." One hundred and fifty survived the memorable charge.

Balance of Power, in European politics, the doctrine that it is the care of all nations to see to it that no one nation becomes too powerful for the rest to handle. The notion is in direct opposition to the theory of a great world power, such as was aimed at by Alexander, and particularly by the "Holy Roman Empire," and in recent years by the German Empire. To disturb this balance is to create distrust, jealousy, and promote war. It is the fundamental care of the League of Nations. The policy of preserving the balance of power began to make itself felt ere the religious wars were brought to a close by the Peace of Westphalia in 1648. During the latter part of the Thirty Years' War, the doctrine was leveled openly at the Austrian power. Richelieu, fearing the growing power of the Hapsburgs, sent the armies and the men of Catholic France to aid the Protestants of North Germany. Fear that Napoleon was growing too great for the rest of the world was one of the causes of his downfall. Fear that Russia might disturb the balance of power kept the Russians out of Constantinople, and caused the world to look on complacently when the Russian bear was drubbed so unmercifully by the Japanese. The doctrine that the balance of power should be preserved springs from a deeper source than mere jealously. It is an assertion of the instinct of self preservation. The doctrine will not down until the nations are federated.

The World War resulted directly, though not wholly, from Germany's threatening the balance of power that obtained in August, 1914; and it was to prevent her attempting it at any future time that she was so summarily dealt with by the allies when the nations gathered at the peace table. Much of the present conflict in the Near East has its source in the struggle to maintain the balance, and every treaty that has been effected among the nations since the signing of the Armistice bears the marks of the signatories' concern for the apportionment of power. The balance of power blocks efforts to disarm, and has much to do with naval ratios.

Balance of Trade, in commerce, the difference between the value of the exports of a country and the value of the imports for the same period of time.

The exports of the United States for the year ending June 30, 1917, amounted to $3,771,181,597
The imports for the same period footed 2,608,009,008
The American balance of trade for that year was the difference, or $1,163,172,589

As we sold more than we bought, the balance of trade was in our favor, and we were a creditor nation.

As a matter of fact, balances of trade are not known with scientific accuracy. If imports and exports were reckoned by weight, the total exports of the world would equal the total imports, allowance being made for loss in transportation. Goods are worth more, however, after they have been carried. A higher valuation is likely to be placed on merchandise when it enters a country than was placed on it in the country where it was produced. Otherwise there would be no inducement to carry. American importers are required to enter their goods at the price paid abroad, as shown by invoices attested by a consul. If this plan were adopted by all countries, or some other universal method were followed, a much greater degree of accuracy would be possible.

Down to the time of Adam Smith, a group of economists, known as the mercantile school, were wont to insist that a country is prosperous commercially only when the balance of trade is in its favor. The advocates of a protective tariff take much the same view. They hold that we should sell abroad, but that what we need should be produced at home. Free traders insist that an unfavorable balance of trade

may be desirable. They do not fail to cite the case of the long continued commercial prosperity of The United Kingdom with an unfavorable balance. In 1910 for instance, the United Kingdom imported food and merchandise to the amount of $1,206,271,000 in excess of exports. The large balance in favor of the United States is absorbed in paying the interest on government bonds.

Balbóa, Vasco Nuñez (1475-1517), a Spanish adventurer. Little is known of his youth, save that he was well born and poor. In 1510 he was a debt-burdened planter in Haiti. In order to escape his creditors and join an expedition in which he was not wanted, he had himself concealed in a cask supposed to contain provisions, and was thus conveyed aboard a vessel about to sail for the American mainland. After various adventures, we find this soldier of fortune setting out from the Caribbean coast with a force of 190 men, 1,000 natives, and a pack of bloodhounds, in search of a great sea and a land of gold of which the Indians told him. September 25, 1513, he gained the summit of the mountains, and the Pacific Ocean was seen for the first time by white men. Five days later he reached the coast and, wading out into the water, he held aloft the flag of his country and took possession of these "seas and lands in the name of the king and queen of Castile." Balboa found the sea of which he was in search, but the discovery of Peru, the land of gold, was reserved for another. Shortly after his return to the Spanish settlement he was thrown into prison by a jealous rival and was beheaded on a charge of treason. Balboa's passage of the isthmus occupied twenty-nine days. The trip now requires but a few hours.

> When with eagle eyes
> He stared at the Pacific, and all his men
> Look'd at each other with a wild surmise,
> Silent, upon a peak in Darien. —Keats.

Balbriggan, a name given to unbleached knitted underwear and hosiery. Balbriggan is a town in Ireland, where, in 1845, a family named Smythe started the manufacture of this class of knitted goods. An attempt was made some years ago to prevent the use of the name by other firms. The name continues, however, in general use. See KNITTING.

Baldness, the absence of hair on the scalp. The commonest cause of baldness is old age. The hair begins to fall usually from the crown and the baldness extends gradually, the top of the head growing bald more rapidly than the back or sides. This sort of baldness is more common in men than in women, it has been thought because men more often wear hats continually, thus giving the scalp too little ventilation. Baldness may be the result of accident. If the hair follicles on any part of the head are injured, the hair will grow no more.

Baldness at an early age, or the rapid falling of the hair is caused usually by defective nutrition arising from poor circulation of the blood in the scalp. One should be able to move the scalp freely with the ends of the fingers. If this cannot be done massage is necessary until increased circulation brings about a more normal condition.

Temporary baldness frequently results from fevers or other diseases. If the health is restored the hair grows again, oftentimes more luxuriantly than before. Another curious fact is that a person with straight hair may, after a fever, grow a crop of curls, or *vice-versa*—one with curls may have straight hair.

So-called hair tonics and too frequent shampooing injure the hair. Cleanliness and gentle massage, with plenty of ventilation, should keep the hair in a vigorous condition. It is said that the boys from Christ's Hospital—the Blue Coat School, as it is called—whose uniform includes no hat, seldom grow bald in old age. It is certain that the wearing of close and heavy headgear for long periods is injurious.

Baldur, bal'der, or **Balder,** in Scandinavian mythology, the son of Odin, called also Alfadur (all father), and his wife Frigg. Baldur was the wisest, the gentlest the most eloquent of the gods. He was called "the Good," and "the Beautiful." "Wherever he went his coming was like the coming of sunshine, and all the beauty of summer was but the shining of his face."

He dwelt where nothing impure could enter, and where all mysteries were made clear. Baldur was beloved by both gods and men. Loki, alone, the god of destruction, was jealous, and hated him.

The story runs that Baldur was tormented by dreams that his life was in danger. His mother, Frigg, exacted an oath from all things in heaven and earth to do him no harm. Fire and water, beasts and birds, trees, stones, and metals, diseases and poisons, all willingly promised not to hurt Baldur, for all loved him. One small tree only, the mistletoe, made no promise for Frigg thought it so young and feeble that an oath from it was unnecessary. Now, of course, Baldur was invulnerable. So the gods delighted to place him in their midst and hurl stones, darts, and battle axes at him. Since they could not hurt him, this treatment was an honor to Baldur. But jealous Loki could not endure the sight. He disguised himself as an old woman and, learning from Frigg that the mistletoe alone had failed to swear the oath of protection, he plucked the little tree and from it shaped an arrow. Among the gods enjoying the sport about Baldur was the blind Hödur. Loki slipped his arrow into Hödur's hand and asked him to shoot, himself guiding the direction the arrow should take. The arrow pierced the heart of Baldur and he fell dead. The lamentations for the beautiful god were loud and long. Finally, at Frigg's request, a messenger was sent to the abode of Hela, goddess of Death, to beg that Baldur might return to Asgard. Hela replied that if all things in heaven and earth would weep for Baldur, he might return. So messengers went forth from Asgard to tell the news, and throughout all the earth and the heavens there was weeping for Baldur. Only one old giantess, Thok, was found sitting in a cavern, who said:

> Thok will wail
> With dry eyes
> Baldur's bale-fire,
> Let Hela keep her own.

Then she laughed a terrible laugh and the messengers knew it was Loki, disguised again, and that Baldur must remain in the abodes of Death.

The story of Baldur is a sun myth. In him is personified the beauty of summer. While Baldur lived all was bright and beautiful in Asgard. With his death began the "twilight of the gods," when Asgard lay in cold shadows and there was wrangling, and murder, and war. So the long northern winter follows the beautiful summer. And as joy and light return after the long winter, so Baldur, after long ages of twilight, returned to the new earth.

Baldur has been made attractive in literature. Matthew Arnold's *Baldur Dead* is a beautiful poem in blank verse. Baldur's funeral is described by William Morris in *The Lovers of Godrun,* a poem in *The Earthly Paradise.* Longfellow's poem, *Tegner's Drapa,* has for its subject the death of Baldur. It was written after the death of Tegner, the Swedish poet. The word Drapa signifies death-song. The story of Baldur is told also in Hamilton Wright Mabie's *Norse Stories.*

See ASGARD; MYTHOLOGY; ODIN; LOKI; RAGNAROK.

Baldwin, James Mark, (1861-) an American psychologist, was born in Columbia, S. C., and was educated at Princeton College, Leipsic, Berlin, and Tubingen universities. He was instructor of German and French at Princeton in 1886-1887; professor of philosophy at Lake Forest University, (1887-1889), and in the University of Toronto (1889-1893). He then became professor of psychology at Princeton University, which position he held until 1903, when he became professor of philosophy and psychology at Johns Hopkins University. He was president of the American Psychological Association in 1897-98. Professor Baldwin was awarded the gold medal of the Royal Academy of Arts and Sciences (Denmark), in 1897, for the best work on the general question of ethics.

He has written, among others, the following books: *Handbook of Psychology* (2 vols. 1889-1891); a translation of Ribot's *German Psychology of To-day; Elements of Psychology; Mental Development of the Child and the Race; Social and Ethical Interpretations in Mental Development; Fragments in Philosophy and*

Science; Development and Evolution; Darwin and the Humanities; The Individual and Society; History of Psychology (2 vols.); *American Neutrality; The Super-State;* also editor of the *Psychological Review* and *Dictionary of Philosophy and Psychology.*

Baldwin, Matthias William (1795-1866), an American inventor, and the father of the American locomotive. Baldwin was apprenticed to a jeweler, and his inventiveness soon became manifest through his improved process for plating gold. Later, he improved on the calico printing process of his time. Baldwin had designed and built a steam engine for his workshop, and he soon began building stationary engines for the trade. Several locomotive engines had been built and operated in England but American railway men were not satisfied with them. The Philadelphia, Germantown & Norristown Railway commissioned Baldwin to build a practical locomotive. He designed and built for them *Old Ironsides,* a locomotive that was in service for 20 years. In 1833, he made another locomotive, and thereby set a general standard for all later locomotive construction; and also laid the foundation of the famous Baldwin Locomotive Works, the largest plant of its kind in the world.

Baldwin, Robert (1804-1858), a Canadian statesman whose unflagging effort was largely responsible for the establishment in Canada of a government responsible to those governed. Mr. Baldwin was born at York (now Toronto), the son of a lawyer. The younger Baldwin, called to the bar in 1825, soon became interested in politics. At that time both Upper and Lower Canada were governed by an oligarchy that controlled the public offices. Popular discontent was crystallized in a demand for an executive council responsible to the legislature. The discontented element elected Baldwin to the Assembly of Upper Canada in 1829, but he lost the seat on a technicality in 1830. In 1836, he was made a member of the executive council, but, unable to make any headway against the reactionaries, he resigned. Baldwin condemned the Radical outbreak of the next few years, and in 1842 he became one of the prominent leaders of the first Canadian administration to accept responsible government. But this principle of government was not yet firmly established, and Baldwin resigned in 1843 because of the opposition of Baron Metcalf to the ministry. But in 1848 Baldwin was again in power, and this time a responsible government was firmly established. Baldwin held office for three years. His ministry saw an unprecedented amount of reform, including a revision of the judicial system of Upper Canada, the foundation of the University of Toronto on a nonsectarian basis, and the organization of municipal government in Toronto.

Balearic Islands, a group of Spanish islands. The group lies in the western Mediterranean, midway between the coast of Spain and Algeria. There are several considerable islands and a number of islets. The larger island is known as Majorca, a name in which *major* is recognized readily. Another is known as Minorca, self evidently a minor island. The total area of the group is 1,935 square miles. The total population is given at 311,649, an average of 161 per square mile. The islands are of limestone formation. The highest peak, on the island of Minorca, rises 5,250 feet above the sea. There are exquisite marbles and veins of lead, iron, coal, cinnabar, and copper. The scenery is beautiful. Sea breezes are said to make the climate tolerable. The inhabitants raise cattle, sheep, and goats. Oil, wine, figs, almonds, melons, pomegranates, hemp, and flax are produced. Pitch, with which to calk boats, etc., was obtained from the islands. Roman epicures prized the edible snails of Majorca. The Carthaginians are known to have taken possession of the islands at a very early date. At the close of the Carthaginian wars, the Balearic Islands fell to the Romans. The celebrated Balearic slingers became a regular contingent of the Roman army. In 423 the islands were occupied by the Vandals, and in 798 they were seized by the Moors. Under the Moors the islands were populous and productive, but became obnoxious for piracy. Christianity applauded when

the Moors were expelled by the king of Aragon in 1232. In 1713 the islands were assigned to the English by the Peace of Utrecht; but in 1803 they were re-ceded to Spain by the Treaty of Amiens. The Balearics now form a regular province of Spain. Palma, the capital, situated on Majorca, is about 150 miles distant by sea from the Spanish port of Barcelona. Poultry raisers will recall the minorcas as a Spanish strain of the common domestic fowl.

Balfe, Michael William (1808-1870), a British composer. He was born in Dublin. At the age of 7, Balfe played difficult violin pieces in public; and in 1827 he was singing Italian grand opera in Paris. He went to Italy, later, and confined himself to operatic composition. The most popular of his thirty or more operas is *The Bohemian Girl.* Upon this opera and upon his *Rose of Castile* and *Satanella* rests his fame.

Balfour, Arthur James (1848-), a famous English statesman whose skill as a debater and whose wealth of common sense have won him an important position in British public affairs. He was born in Scotland and educated at Eton and at Trinity College, Cambridge. During 1878-80, Mr. Balfour was private secretary to his uncle, the Marquis of Salisbury, Secretary of State for Foreign Affairs. Entering the House of Commons in 1874 as a member for Hartford, he served until 1885, and represented Manchester from 1886 to 1905. Mr. Balfour was President of the Local Government Board in 1885, Secretary of State for Scotland in 1886, and Chief Secretary for Ireland in 1887. In 1891-92, he was First Lord of the Treasury, and on the retirement of Lord Salisbury in 1902 Mr. Balfour succeeded to the Premiership. As Premier, he succeeded in getting through the Education Act of 1902, the Irish Land Act of 1904, and he created the Committee of National Defense. When Mr. Chamberlain, the Colonial Secretary, resigned in 1903 and raised the fiscal question, Mr. Balfour expressed agreement with his proposals, but held that the time was not ripe for the taxation of food. In the winter of 1905, opposition to Mr. Balfour's administration became so effective that he was forced to resign, being succeeded by Sir Henry Campbell-Bannerman. Since 1906, he has represented the City of London in Parliament. Mr. Balfour became head of the Admiralty in 1915, and, being made Secretary of State for Foreign Affairs, he headed the British War Mission to the United States in 1917 and served as delegate to the Versailles Peace Conference in 1919. He is the author of *Theism and Humanism, Criticism and Beauty,* and *Speeches on Fiscal Reform.*

Baliol, bā'le-ol or băl'yol, **John,** a Scottish nobleman. He lived 1249-1315. Baliol and Robert Bruce were competitors for the vacant throne of Scotland. The supporters of the former succeeded in referring the matter to Edward I of England who decided in favor of Baliol, but took opportunity to make him and Scotland subordinate to the English crown. This procedure made Baliol very unpopular with his countrymen. He was subsequently deposed by Edward. He died in Normandy shortly after his former rival, the Bruce, had won the famous victory of Bannockburn. The Scots called Baliol "Toom Tabard," or empty-jacket. His son Edward invaded Scotland with English backing in 1332, and succeeded in making himself king of the Scots for a period of three months. See BRUCE; SCOTLAND.

Balkan Peninsula, the southeastern-most peninsula of Europe. It lies between the Adriatic and the Black Sea. The term is held usually to include the territory south of the Save and the Danube. In this sense the peninsula included Greece, Turkey in Europe, Montenegro, Servia, Bulgaria, a part of Austria-Hungary, and a part of Roumania. The name is derived from the Balkan Mountains. What to do with the Balkans was a vexing question at Paris. Finally, Jugo-Slavia, a new republic, was evolved from Serbia, Bosnia, Herzegovina, Montenegro, and Croatia, with Belgrade as capital. The population of the state is 7,000,000 and mostly of one blood. Serbia and Montenegro were independent states, but the others were parts of Austria. Greece, Bulgaria, and Rou-

mania received territory from Turkey and Austria, Albania suffered some changes, Constantinople will be governed by the Allies—thus has the Balkan Country been remapped and Turkey in Europe has passed away. See JUGO-SLAVIA; CZECHO-SLOVAKIA; BULGARIA.

Balkan Wars, the wars fought in the Balkan Peninsula in 1912-13. Their origin was the establishment of the Turkish empire in Europe in the fourteenth and fifteenth centuries, though this origin is sometimes obscured by recent events. In the first war, Bulgaria, Serbia, Montenegro and Greece were allied against Turkey; while in the second war, which resulted immediately from the first, Serbia, Greece, Rumania and Montenegro were allied against Bulgaria.

When the Turks advanced into Europe and conquered some of the peoples of the Balkan Peninsula, they left to the conquered the rights of religious freedom and of local political independence; with the result that the people, though under Turkish rule, retained their national identity and still adhered to the Christian faith. Uprisings were continual from the time of the Turk's coming to Europe until the great uprising known as the first Balkan War.

The power of the Turkish Empire began to decline in the seventeenth and eighteenth centuries, at the same time that the nationalistic feeling took root in the various Balkan states. Russia was encroaching upon Turkish territory and influence, and was at the same time encouraging the little states to throw off the Turkish yoke; but while these states won their independence of the Turk and recognition of that independence by the ambitious European powers, the conflict of interests between the latter and the Balkan states barred these states from their ultimate goal—the definition of boundaries in accordance with the nationality of the peoples. Save for Montenegro, each of the Balkan states was dominating territory that was claimed by another. The problem was further complicated and war was made inevitable by the fact that the Turk still held Albania and Macedonia, which all the other states wanted. Other complicating factors were the Young Turkish revolution of 1908, Austria's annexation of Herzegovina and Bosnia, and Bulgaria's declaration of independence.

Turkey had been materially weakened by the war with Italy, 1911-12, so that the allied Balkans declared war against their ancient enemy with a more than fair chance of success. The Turks, as a matter of fact, had a much larger army on paper than they had in the field, while the reverse was, at least partially, true of the allies. Mobilization was begun by the allies in September, 1912, and an elaborate and effective plan of campaign was drawn. The Bulgarians, upon whom the burden of the fighting fell, inflicted severe punishment on the Turks at the battles of Kirk-Kilisse and Lule Burgas, and the Greeks defeated a strong Turkish force and took Saloniki. The Turk was soon suing for peace; and in December, 1912, a conference met in London to discuss terms. Turkey would not accede to the allied demands, and the war resumed in February, 1913. In the second part of the war, the allies captured Scutari, Janina and Adrianople. Hostilities stopped again in May.

Turkey was brought to terms at the second peace conference, also held in London. Almost all of her European territory was taken and allocated to the allies. Greece was given the island of Crete and the province of Saloniki; Bulgaria gained territory down to the Aegean Sea; and to Serbia was given a strip of territory in Macedonia. These apportionments, however, immediately gave rise to conflict among the allies. Bulgaria had made a secret treaty with Serbia governing the distribution of the territory they hoped to take from Turkey, the treaty saying, in part, that Serbia was to be given the larger part of Albania and thus gain a port on the Adriatic Sea. But Albania was made an independent state and Serbia was deprived of her share of the territory, while Bulgaria received even more than the treaty with Serbia had promised. Serbia protested that she could not be bound by that treaty, and Bulgaria answered that she was and must remain bound.

In the spring of 1913, however, Serbia definitely announced that so far as she was concerned the treaty was no longer operative. Greece, also, began making claims upon Bulgaria, and another war loomed. New alliances were made and old ones renewed among the states, and in June, 1913, Bulgaria opened hostilities. Within a month the allies were close upon the Bulgarian capital. Bulgaria sued for an armistice. A treaty was signed at Bucharest, whereby Bulgaria lost a large part of the territory gained from Turkey. Turkey, while the all-Balkan affair was in progress, had retaken Adrianople, which had been alloted to Bulgaria by the Treaty of London. Bulgaria was forced to cede the fortress and a large strip of territory to Turkey. Bulgaria, therefore, issued from the two wars but little richer in territory than when she went in, and very much poorer in men and money. Greece and Montenegro made the largest gains.

But what is known in diplomatic circles as the Eastern Question not only was not solved, but really became more complicated. In the year following the treaty between Bulgaria and the other Balkan states, Austria's action against Serbia precipitated the World War, and a new alignment among the Balkan states followed. Rumania, Serbia and Montenegro joined the Allies; Bulgaria, with Turkey, joined forces with Germany, while Greece maintained a doubtful neutrality. Since the close of the world conflict, however, the Turk and the Greek have been at war. The Greek forces in Asia Minor were thoroughly defeated, the Turks have seized the Dardanelles and have advanced into Greece as far as the Maritza River. The Eastern question is not yet settled.

See ALBANIA, AUSTRIA, BULGARIA, GREECE, MONTENEGRO, RUMANIA, SERBIA, TURKEY, DARDANELLES, WORLD WAR.

Ball. See BASKET BALL; BASEBALL; FOOTBALL; CRICKET; LACROSSE.

Ball, John, "the mad priest," an English priest who took part in the rising of the peasantry under Wat the Tyler. He was a Lollard, a follower of Wyclif's teachings. He pleased the peasants by inveighing on the equity of gentry and villeins, and was thrice imprisoned by an archbishop for preaching heresy. He was in jail at Maidstone when the peasants rose. One of their first efforts was to set him free. They escorted him to Blackheath, where he exhorted them, so it is said from the text,

> When Adam dalf and Eve span
> Who was thanne a gentilman!

After the murder of Wat the Tyler, Ball fled, but was overtaken at Coventry and was executed at St. Albans July 15, 1381, in the presence, it is said, of the king. See LOLLARDS; WAT THE TYLER.

This priest used oftentimes to go and preach when the people in the villages were coming out from mass; and he would make them gather about him, and would say thus: "Good people, things go not well in England, nor will, till everything be in common and there no more be villeins and gentlemen. By what right are they whom we call lords greater folk than we? We be all come from one father and one mother, Adam and Eve, . . . but they are clothed in velvet and are warm in their furs, while we shiver in rags; they have wine, and spices, and fair bread; and we, oat cake and straw, and water to drink; they dwell in fair houses, and we have the pain and travail, the rain and the wind in the fields. Yet from our labor they keep their estate." And so the people would murmur one with the other in the fields, and in the ways as they met together, affirming that John Ball spoke truth.—Froissart.

The peasants were dispersed and defeated, their leaders were tried, sentenced and hanged; but the solid fruits of victory rested with the insurgents of June, 1381. Once in the history of England only—once, perhaps, only in the history of the world—peasants and artizans attempted to effect a revolution by force. They nearly succeeded—at least they became for a short time the masters of the situation. The English laborer, for a century or more, became virtually free and constantly prosperous.—Thorold Rogers.

Ball, Thomas, (1819-1911), an American sculptor, whose work has been of a permanent influence in the United States. He became interested in art while in the employ of the old New England Museum, in Boston. His first important work was a bust of Daniel Webster. He later went to Florence to study. Among his other works are an equestrian statue of Washington, a statue of Edwin Forrest, a bronze of President Lincoln freeing a kneeling slave, called the *Emancipation Group,* and a large bronze of *Daniel Webster.*

Ballad, a simple, direct, and often crude narrative poem relating the fortunes or misfortunes of persons in a way to arouse deep feeling and interest in the auditor. The term ballad is akin to ballet, a dance. The ballad took its name from the dance to which it formed an accompaniment among primitive peoples. In brief, its origin was this: At some stirring event, —the outbreak of war, a victory, a defeat, a brave deed, a marriage, the death of a hero—the people gathered to rejoice, to mourn, or to perform religious rites. They chanted the story of the occurrence in rude song, accompanied with dance and gesture. This crowd singing, it must be borne in mind, was entirely spontaneous,—the pure expression of feeling where all felt alike.

The oldest known English ballads are those which sang the exploits of the famous Robin Hood. They date from the thirteenth century. Until the introduction of printing, toward the end of the fifteenth century, ballads must needs be handed down from father to son, usually by word of mouth, though some manuscript copies have been preserved. In 1765 Bishop Percy collected and edited these early poems with painstaking care. His work, entitled, *Reliques of Ancient English Poetry,* is still the most noted collection of early English ballads. Most of these earlier ballads are artless and simple, but they are fresh and wild and unstudied. A few stanzas taken from different ballads will give an idea of the style and versification prevalent. The first stanza is from *Chevy Chase*:

God prosper long our noble king,
  Our liffes and safetyes all;
A woeful hunting once there did
  In Chevy-Chase befall.
To drive the deere with hound and horne,
  Erle Percy took his way;
The child may rue that is unborne
  The hunting of that day.

From *Robin Hood and Allan-a-Dale:*

Then Robin Hood put his horn to his mouth
  And blew blasts two and three;
When four-and-twenty bowmen bold
  Came leaping over the lea.

From *Sir Patrick Spens:*

O lang, lang, may the ladies sit,
  Wi' their fans into their hand,
Before they see Sir Patrick Spens
  Come sailing to the strand!

And lang, lang, may the maidens sit,
  With their goud kaims in their hair
A' waiting for their ain dear loves,
  For them they'll see nae mair!
O forty miles off Aberdeen,
  'Tis fifty fathoms deep,
And there lies gude Sir Patrick Spens
  Wi' the Scots lords at his feet.

As culture and education advanced with the invention of printing, the minstrel gradually disappeared, the conscious poet taking his place, giving us such ballads as those by Coleridge and Macaulay, which, however, possess so few of the qualities of the old "folk song" that we must needs class the two as traditional and artistic ballads respectively. We thus see three periods in the development of the ballad:

1. The spontaneous singing of a crowd moved by the same emotion.
2. The song of an individual improvised to please a crowd or praise a hero.
3. The conscious song of the educated poet.

Well known English ballads are:

Bannockburn	Robert Burns
Betsy and I are Out	Will Carleton
Charge of the Light Brigade	Alfred Tennyson
Chevy Chase	(English Ballad)
Edinburgh after Flodden	W. E. Aytoun
Hermit, The	Oliver Goldsmith
Horatius	T. B. Macaulay
Hohenlinden	Thomas Campbell
How He Saved Saint Michael's	Mary Stansbury
How They Brought the Good News from Ghent to Aix	Robert Browning
John Gilpin's Ride	William Cowper
Lochinvar	Walter Scott
Lord Ullen's Daughter	Thomas Campbell
Marco Bozarris	Halleck
Marmion and Douglas	Walter Scott
Mary Garvin	John G. Whittier
Paul Revere's Ride	Longfellow
Relief of Lucknow, The	R. T. S. Lowell
Rime of the Ancient Mariner	S. T. Coleridge
Sheridan's Ride	T. B. Read.
Sir Patrick Spens	(English Ballad).

As we read Percy's *Reliques of Ancient English Poetry,* the old minstrels place us under a spell, and, for the time, make us forgetful of the fascination of the modern poets. We are transported back to the days of rude life in England. We sup, and watch, and fight, and love with the brave, lawless yeomen. Strive as they may, our poets of a nobler civilization cannot produce companion-pieces to the *Ancient Ballad of Chevy Chase,* or to *Adam Bell, Clym*

of the Clough, and William of Cloudesley. "Young Lochinvar" and "Sheridan's Ride" are spirited, but they do not approach the old ballads in graphic terseness, in poetic simplicity, in fiery fervor, in tenderness of pathos. The reproduction of such poetry is prevented by the civilization of this age. Law, not lawlessness, is honored now. Personal prowess, reckless daring, are dangerous to society in this day; they gave protection to little bands in the English wood; they received the grateful applause of men who lived amid the perils of the Scottish Border. It was the hardihood of this age that produced the old ballads.—Shaw.

If we bear in mind the dominant importance of the individual, the artist, in advancing stages of poetry, it is easy to understand why, for civilized and lettered communities, the ballad has ceased to have any vitality whatever. . . . Indeed, paper and ink, the agents of preservation in the case of ordinary verse, are for ballads the agents of destruction.—*Americana.*

The popular ballads have passed away with the conditions which produced them. Modern poets have, in several instances, written ballads of striking picturesqueness and power, but as unlike the ballad of popular origin as the world of today is unlike the world in which "Chevy Chase" was first sung. These modern ballads are not necessarily better or worse than their predecessors; but they are necessarily different. It is idle to exalt the wild flower at the expense of the garden flower; each has its fragrance, its beauty, its sentiment; and the world is wide!—Hamilton Wright Mabie.

Ballast, any weight carried in the hold of a ship to keep it right side up. It is necessary, especially in the case of a sailing ship, to load the hold heavily, or the immense expanse of canvas spread to the wind may cause the ship to tip over. In the case of an empty ship going after cargo, or departing from port with a light load, sailors take on board any heavy material, as bags of sand, gravel, stones, or earth. The best of all ballast is, of course, bars of iron, or better yet, lead, that lie low and occupy little space. Harbor rules enforced by the authorities of the various ports prescribe the places where the ballast of incoming ships may be thrown overboard, so as not to obstruct the channel. Very frequently it is piled up on the shore, so as to be available for the next ship that needs it. Steam vessels showing little canvas require less ballast. Most modern ships use water, which is pumped into or out of tanks arranged for the purpose. In the case of war ships with a heavy weight of guns on deck, heavy ballasting of lead is run into the lowest part of the hold to balance the metal above. The term is also applied to the bags of sand carried in balloon ascensions, and to the earth packed between the sleepers on a railroad track. An unstable person is said to lack ballast.

Ballet, băl-lā′, a spectacular dance, usually presented as an interlude in a theatrical performance. The ballet is made elaborate by the number of performers, and by the variety of steps, poses, and costumes.

Balliol College. See OXFORD.

Balloon, a bag filled with helium, hydrogen, coal gas, hot air, or other gas lighter than the atmosphere. When released, the downward pressure of the atmosphere forces the balloon upward until it reaches a position in the atmosphere where its weight is equal to that of the air displaced. Balloon ascensions are accomplished in a light car or cage attached to a large balloon. Those who make the attempt are called aeronauts, or air navigators. A navigator carries usually a supply of ballast, or sand in bags, which he may throw out if he desires his car to rise higher. The balloon is furnished with a valve controlled by a cord so that the navigator may allow gas to escape when he wishes to come down. Balloon navigation is attended with great risks. Sometimes a balloon is caught in an upper current of air, and carried away off to the ocean, where it is never heard of again. Not infrequently some accident causes the entire contrivance to drop to the ground, killing the occupants of the cage.

The construction of the first balloon is credited to Stephen and Joseph Montgolfier, sons of a paper maker of Annonay, France. They experimented at first with paper bags filled with smoke. Then they constructed a linen bag about thirty feet in diameter, and filled it with hot air by means of a straw fire. This balloon rose June 5, 1783, to a height of about a mile and one-half to the great astonishment of the villagers. In August of the same year M. Charles of Paris constructed a large silk balloon, and, after four days of work with sulphuric acid and iron filings, succeeded in filling it with hydrogen gas. He allowed it to rise from the Champ de Mars

in Paris. It rose to a height of about 3,000 feet, and remained in full view of an immense crowd of people for about three quarters of an hour. It then drifted away and fell about fifteen miles off in the field of some peasants, who were terrified beyond measure and attacked it and tore it to pieces under the impression that it was a dangerous monster of some sort. In November of the same year two Frenchmen attached a car to a balloon. They rose about 500 feet, remained twenty-five minutes in the air, traveling a horizontal distance of five miles.

From this time on one experiment succeeded another. A high ascension was made September 5, 1862, by Messrs. Glaisher and Coxwell. They reached a height of 29,000 feet, or about five and one-half miles. At that height they recorded a temperature of —2°F., and a barometric pressure of 11.28 inches. Professor Berson of Berlin ascended in 1894 to a height of 28,750 feet. His record shows a temperature of 54°F. A correct observation at that date was well-nigh impossible owing to the intense cold, and physical depression for want of oxygen in the rarified high altitude. Today, at a height of more than 30,000 feet recently attained by an aviator, he was competent to handle his instruments with care owing to electrically-heated clothing and oxygen artificially administered to his lungs by tubes from an oxygen tank.

Balloons sent up at the Paris Exposition in 1900 made remarkable journeys to Sweden, Germany, and Poland. One traveled 1,193 miles in 36 hours and 45 minutes. The greatest height attained by any of these balloons was 21,582 feet, Two Frenchmen journeyed by balloon from Crystal Palace, London, to St. Denis, a suburb of Paris, a distance of 250 miles, in 6½ hours. Empty balloons have been sent up beyond the limits of human life. In 1893 a balloon with a self-registering barometer was sent up at Paris. If the instrument record is correct, the balloon rose nearly ten miles. A balloon sent up at Berlin reached an altitude of eleven and one-half miles. A self-registering barometer recorded 75° below zero.

A recent device is the addition of a camera with which to make protographic observations. At a height of 3,000 feet a fleet thirty miles away may be photographed.

The most efficient of all types of dirigibles is the Zeppelin. This is what is called the rigid type. The Parseval is a semi-rigid type. The difference between the two is that the first has a rigid framework of light metal into which are placed a large number of gas-bags. The framework holding them is covered by an envelope which is held rigid. This is to protect the bags from atmospheric changes. The second type is a large gas-bag from which a car is suspended. In the first, one or more bags may be punctured without seriously crippling the machine. If the other has its bag injured badly the whole affair collapses. Those not willing to grant the superiority of the dirigible on land must at least grant its supremacy on the sea. It can speed before the gale, remain motionless in air while its motor is repaired, it can carry more fuel and remain in the air longer than an airplane. As a fighter it is too unwieldy, but as a spy it is unrivalled, soaring high above the range of guns and spying out every corner of the sea. The English since the war have projected dirigibles carrying 300 tons and containing 10,000,000 feet of gas.

The rigid dirigible is the long distance airship of the future as well as the heavy freighter. It can climb from 6,000 to 23,000 feet easily; it is cheaper and safer to operate than the airplane, for long distances. The cars can be roomy and luxurious. American science contributed as a war benefit a non-inflammable gas called "helium," thus practically eliminating the danger of fire.

Captive balloons were much used during the great war in Europe, 1914-1918, for making observations and directing artillery fire. Such balloons are held captive to the earth by means of a cable which winds about a drum or windlass and is let out or hauled in by hand or a small engine. They have long been used for amusement purposes at fairs and expositions; a captive balloon of 45,000 cubic feet capacity, carrying 40 passengers, was one of the fea-

tures of the International Exposition at Paris in 1878.

Balloon races for a cup donated by James Gordon Bennett have been held in Europe each year since 1906, with the exception of the war years. American balloonists won four out of the eleven races held up to 1922; Germans two, Swiss two, Belgians two, and the French one. The greatest distance traveled by a balloon in these races was 1,354 miles, covered by Maurice Benaims, of France, in 1912. Alan R. Hawley and Augustus Post, Americans, won the race in 1910 with a distance of 1,171 miles, and in 1920 a Belgian won with 1,100 miles. The world's dirigible balloon record for altitude is 9,514 feet, with six passengers. The record for height in an ordinary gas balloon is 28,750 feet. See AIRSHIP.

Ballot, a written or printed vote. Voting by ballot differs from a rising vote, a show of hands, answering a roll call, and all other such forms of voting, in that it is a method intended to secure secrecy. The ballot is not a modern invention. Athenian juries voted by ballot as early as the fifth century before Christ. The jurymen cast a white pebble, bean, or ball for acquittal and a black one for conviction. Sometimes shells or pieces of metal were used as ballots. An unpierced shell corresponded to a white ball; a pierced shell to a black ball. A very pretty system of writing the names of candidates on olive leaves was in use in Syracuse. As early as 139 B. C. the Gabinian law provided ballot boxes for elections in the Roman Assembly. The method adopted by the Romans seems quite modern. The names of candidates were written on tablets. The votes were thrown into a chest, where they were guarded by inspectors. Clerks counted the votes and handed them over to the judges. In case of a tie, the election was decided by lot.

Voting by ballot is an old English custom. White and black balls were used by many societies in voting for new members. White balls were favorable; black balls unfavorable. To vote against a proposed member was to "blackball" him. The directors of the Virginia Company were elected every year by ballot. Public elections by ballot were not introduced into England, however, until 1872. In England the system of voting by word of mouth in public was long depended upon by landlords and politicians as a means of controlling the votes of their tenants and followers. Daniel O'Connell introduced a bill on the subject in 1830, but Parliament rejected it. Macaulay and the historian Grote favored the ballot. Sydney Smith, leader of the wits, ridiculed the ballot box as a "mouse trap to catch voters." Land owners, generally, opposed balloting strenuously on the ground that an open vote developed manliness and courage, while balloting gave opportunity for sneaking and deception. In 1870 the question of the ballot came to a head. Lord Hartington reported for a committee that "corruption, treating, and intimidation by priests and landlords took place to a large extent at both parliamentary and municipal elections in both England and Ireland; and that the ballot, if adopted, would probably not only promote tranquility at elections, but protect voters from undue influence, and introduce greater freedom and purity in voting, provided secrecy was made inviolable." After trying the ballot system in an experimental way, the Ballot Act of Mr. Forster, in 1872, required the voters at all parliamentary and municipal elections, except in universities, to use ballots.

So far as known the first written ballot cast in America was that for the pastor of a Salem church, July 20, 1629. The ballot gradually supplanted open voting. Voting by ballot became general in New England at an early date. No other method has ever prevailed in the West. Several of the Southern States, however, adhered to the open ballot until quite recently. Kentucky did not adopt the ballot system for local and state elections until 1891. Formerly each party prepared its own ballot. Although the laws require that all ballots be printed on white paper, there are different degrees of whiteness and different sizes of paper. It was still quite possible to determine from the appearance

of the ballot what party the voter was supporting. To afford greater secrecy, a method was devised in South Australia, and has been adopted by a number of states. According to the Australian system, one ballot, officially prepared, contains the names of all the candidates for the several offices. The voter is handed one of these ballots. He retires to a booth by himself where he marks the names of those for whom he wishes to vote.

Balls Bluff, Battle of, a minor engagement of the Civil War, fought October 21, 1861, at Balls Bluff, Va., on the Potomac River, about 30 miles northwest of Washington, D. C., between a Federal force of about 2,000 under Col. E. D. Baker and a Confederate force of about 3,000 under Gen. N. G. Evans. The Confederates were victorious. The Federals lost in killed, wounded, and missing, about 900, including Col. Baker, who was killed; the Confederates less than 300. This battle had an effect greatly out of proportion to its military importance. The result inspired the South and depressed the North.

Balm of Gilead, a resinous liquid obtained from incisions in the bark of a small tree in Arabia and Abyssinia. It was counted a precious substance in Bible times for its fragrance and medicinal qualities. It is a yellow, honey-like substance. Mixed with oil, it constitutes the sacred ointment used in the Roman Catholic church at the consecration of a bishop, and in the rites of baptism of children, confirmation of church members, ordinations of the clergy, and coronation of kings. It is used also in the consecration of churches, altars, and baptismal fonts. The name Balm of Gilead is applied in the United States to a large, glossy-leafed, waxy, warty poplar, which, because of its spreading branches, is sometimes planted as a shade tree. The large buds are covered with a resinous gum, hence the name.

Balmoral, băl-mŏr′al, originally a special variety of woolen petticoat dyed red, with blue and black stripes around the bottom. When these were worn, the dress skirt was tucked up or looped to display the gay undergarment. The fashion was first adopted by the daughters of Queen Victoria during their residence at Balmoral, Scotland. The meaning of the name Balmoral has been extended to include various articles of dress of unusual strength and weight. Balmoral shoes are stout walking shoes laced in front. George Eliot speaks of "a man who uses his balmorals to tread on your toes."

Balmoral Castle, for many years the autumn home of Queen Victoria and her family. It is situated in northern Scotland, in a beautiful dell of Braemar, forty-eight miles west of Aberdeen. Prince Albert, Queen Victoria's husband, bought the estate for $150,000 in 1848-52, and erected the present castle of granite. The estate now includes 40,000 acres, three-fourths of which are a deer forest, with several fine trout lochs. Queen Victoria was very partial to Balmoral and is remembered there with intense affection. For many years fashions were supposed to be set by Balmoral and the name became attached to various articles of feminine attire. See VICTORIA.

Balsam, a kind of resinous oil. There is confusion in the use of the term. The lumberman would be surprised to learn that it is applied to anything but the fragrant, balsam-producing fir tree of his northern woods and swamps. The florist's balsam is the garden touch-me-not. The woodman of Ohio might very possibly sell you a load of resinous poplar as "balsam." Ask a druggist for balsam, and he would be likely to offer a bottle of medicine extracted from a beautiful tree of Peru and Mexico, or else balsam of Tolu from the forests of the Magdalena. Generally speaking, the term applies to a healing, medicinal, resinous oil, and to the several widely different plants producing it. The balsam of the botanist is an herb with alternate leaves, and showy, somewhat clustered, yellow flowers. There are about 220 species, most of which are natives of tropical Asia. They have been introduced into many other countries. Beside being called balsam this herb is also known as jewel-weed, or snap-weed. It grows wild in moist grounds or along brooks or streams from Nova Scotia to

Oregon and Alaska, south to Florida and Missouri. The cultivated varieties are of many colors, red, white, or purple, and the flowers are larger than those of the wild species. See BALM OF GILEAD.

Baltic Sea, a shallow, irregular-shaped body of water, extending in a northeasterly direction from the North Sea. The name, it is thought, signifies white. The Baltic separates Germany and Russia from the lower extremity of the Scandinavian Peninsula. Denmark guards the entrance. In 1895 a ship canal was completed between the mouth of the Elbe near Hamburg and Kiel Bay on the Baltic. It lies entirely within German territory, and shortens the route from London to Baltic ports by several hundred miles. The waters of the Baltic are fresher than those of the ocean. Owing to the large number of rivers that empty into it, they contain only one-fifth as much salt as does seawater. They are also clearer, and freeze more readily. The arms and harbors of the Baltic are covered with ice during the winter season and the sea is closed to navigation. The coasts of the Baltic have long been famous for amber, still cast ashore. The open sea has a reputation for rough weather, but there are many safe ports. The tides rise and fall about a foot. With its arms, the Gulf of Finland and the Gulf of Bothnia, the area of the Baltic is about twice that of our Great Lakes. The area drained into the Baltic is a fifth of all Europe. The fauna is that of a body of fresh water. Whales seldom venture in. The water is too fresh to sustain the life of oysters, but salmon, salmon-trout, and small herring are abundant. The fishing season is cut short by winter. At this season fishermen are afraid of being surrounded by floating ice and frozen in. See STOCKHOLM;

Baltimore, the chief city of Maryland, and the metropolis of a large territory. It is named for Lord Baltimore, whose colors, orange and black, are worn by the familiar oriole. It is built on a harbor-like spur of the Patapsco. This river is practically an arm of the Chesapeake. It is only fourteen miles in length, but it is navigable for ships of twenty-seven feet draught. In 1729 a farm occupying the site of the present heart of the city was laid off into blocks and streets. In 1752 there were but twenty-five houses, only four of which were of brick. At the opening of the Revolutionary War there were about 6,000 inhabitants. In the early part of the nineteenth century Baltimore was a rival of New York. The building of the Erie Canal and the railroads that lead through the long pass of the Hudson and Mohawk valleys decided the contest in favor of New York. Baltimore fell behind neither for lack of enterprise nor on account of local facilities, but because the products of the West could reach the seaboard more cheaply by way of the Mohawk Valley than over the high ridges of the Appalachian Mountains. If a low pass had existed between the valley of the Ohio and that of the Potomac, it is probable that the chief commercial city of the United States would have been located on the Chesapeake, presumably at Baltimore. Nevertheless the city has prospered wonderfully. The Civil War gave it prestige by interfering with the business of southern rivals. Baltimore now has an area of nearly 32 square miles. The census of 1920 reported a population of 733,820, making Baltimore the seventh city in the Union. In exports it ranks second in the Union, and in imports it is fifth. The annual exports to foreign countries, including corn, small grain, flour, live stock, provisions, tobacco, boots, shoes, cotton, oysters, canned fruits, vegetables and machinery, cannot be far from $120,000,000 in value. It is the American port of a number of transatlantic steamship lines, including the North German Lloyd, Hamburg-American, and Red Star lines, and is also in regular communication by steamer with all the principal Atlantic ports from Halifax to New Orleans. A large number of railroads, including the Baltimore & Ohio, and the Pennsylvania, serve the city. Baltimore is an important manufacturing center, its industrial plants numbering more than six thousand. The most important products of these plants are men's clothing, cotton ducking, fertilizer,

straw goods, ships, flour, furniture, tobacco, canned fruit, canned oysters, sheet iron, tin and copper ware, planing mill products and machinery. It is one of the leading oyster markets of the world, and one of the greatest corn exporting cities.

The various sections of the city meet at all sorts of angles. Until lately, the streets of Baltimore were paved with cobblestones; these have now given way to smooth modern paving in the larger portion of the city. The public squares and principal parts of the city are beautifully laid out, surrounded by handsome buildings, and adorned with statues. The Washington monument in Mt. Vernon Place is 180 feet in height, with a colossal statue of George Washington on the summit. A winding stairway of 220 steps within the shaft leads to the top, from which one can obtain a magnificent view of the Chesapeake, the Patapsco, the city, and its harbor guarded by old Fort McHenry, o'er which "the star spangled banner still waves." Among other memorials earning for Baltimore the title of the "Monumental City," is one erected to commemorate those who lost their lives in defending the city against the British in 1814. Baltimore has been fortunate in the liberality of its wealthy merchants. The Peabody Institute, the Enoch Pratt Free Library, and the Johns Hopkins Hospital are memorials of the men whose names they bear.

Maryland was settled largely by Catholics, and in Baltimore the members of the Roman Catholic Church outnumber those of any other denomination.

In addition to the public schools and a number of denominational and charitable institutions, Baltimore is fortunate in the possession of Johns Hopkins University, a richly endowed institution noted for scholarship. It does not offer courses in the lower years of college work, but devotes its energies to advanced instruction, in which it ranks favorably with the most renowned universities in Europe. Among other important educational institutions are Bryn Mawr, Loyola College, Saint Joseph's Seminary, and De Sales Academy.

See KEY, JOHNS HOPKINS, CHESAPEAKE, MARYLAND, OYSTER.

Baltimore, Lord (1580-1632), a title created by King James I for Sir George Calvert. Calvert was secretary of state to James I for some years and was knighted by him in 1617. A few years later he was converted to the Roman Catholic religion and on this account resigned his position. He retained, however, the favor and confidence of the king, who raised him to the Irish peerage with the hereditary title of Lord or Baron Baltimore. He received also a patent as Lord of Avalon in Newfoundland. He found this colony so exposed to French attack that he left it, obtaining in its place a grant for Maryland. Before the charter was completed Lord Baltimore died, but the charter was given to his son, Cecil Calvert, Lord Baltimore, who founded the colony of Maryland. The city of Baltimore was named for this family, and since Lord Baltimore's colors were black and orange, the Baltimore oriole, one of our brightest birds, has received his name.

Baltimore Oriole, (Golden Robin, Hang Bird or Fire Bird), a songster that builds its home in the northern part of the United States during the summer, well known for its sweet whistling and gorgeous plumage. By preference it makes its nest, which is in the main the work of the female, in the swaying branches of the elm or willow. This nest is a pendent structure in the form of a long sac with an opening at the top, hanging some distance from the ground and covered with leaves. It is constructed principally of vegetable fibers, grass, strips of bark, strings, etc. The eggs are dull white with dashes of brown, and number from four to six. The feathers of the male bird are a shining black on head and upper parts, wings white-tipped, and the under parts a brilliant yellow. His mate is much smaller and paler in coloring. The favorite food of the oriole is caterpillars, small insects, etc., so they are useful and harmless.

Baluchistan', a dependency of India. It lies on the northwestern frontier of India. It lies between Afghanistan and the Arabian Sea. The entire country may

be classified as British "administered" territory, native states, and tribal areas. The total area is 134,638 square miles. The population is about 850,000. In matters of religion nineteen-twentieths of the people are Mohammedans. The surface consists largely of deserts, stony plains, and mountains. The climate is considered severe. Rainfall is uncertain. Nevertheless, the soil is fertile wherever water can be had. Corn, potatoes, millet, alfalfa, rice, wheat, and barley are important crops. Melons, grapes, apricots, peaches, apples, and, on the coast, dates, are grown to perfection. Camels, horses, cattle, and donkeys are the most important domestic animals. As in Afghanistan and Persia, the peasants excel in making rugs, blankets, needlework, leather work, and pottery.

Balzac, băl′zäk, **Honoré de** (1779-1850), a noted French novelist. He was born at Tours. He began his literary career as a writer for the Paris papers, but soon developed into a writer of anonymous novels. At the age of thirty, *The Last of the Chouans* appeared over his own name. It is not only one of his best stories, but the one best fitted, perhaps, for young readers. Balzac planned a vast series of novels to be known as *The Human Comedy,* in which he proposed to classify the follies and peculiarities of human nature in four groups of novels, entitled: *Scenes of Private Life; of Parisian Life; of Political Life; of Military Life.* He actually wrote eighty-five novels in twenty years. Library sets of his works contain twenty-five volumes. He aimed to leave to future generations a series of social pictures such as he wished had been left by earlier writers.

Bamboo, a genus of grasses. Fishing poles from the canebrakes of Kentucky are not genuine bamboos, but they are closely related to bamboos and give a good idea of them. There are 200 kinds of bamboos growing in tropical countries everywhere from Equador to the East Indies. The pygmy bamboo of Japan is only a hand's breadth high and forms a carpet underfoot. The bamboo of Quito reaches sixteen inches in diameter and a height of a hundred feet. Bamboos grow at the sea level and at an elevation of 12,000 feet up the sides of tropical mountains. Generally speaking, however, the common bamboo is the particular species cultivated in Japan, China, India, Siam, and the East Indian archipelago. Except that it is larger, it resembles our Kentucky cane very closely. The stems are slender. A five-inch cane rises to a height of fifty feet; a bamboo eighty feet high seldom exceeds a foot in diameter. The stem, like that of oats and all other grasses, is hollow, jointed, and hardened like flint on the outside. Bamboos grow with great rapidity, shooting up under favorable conditions from six to thirty inches a day. Delicate foliage springing from the joints give the upper part of the stem a plume-like appearance.

The uses to which an ingenious but not enlightened people can put bamboo are numerous and interesting. Bamboo stems form the framework of houses. Bamboo splints are woven into lattice work for outer walls and partitions. Split bamboo is used for floors, and the roof is made of bamboo leaves laid on bamboo poles. The joints of the stem are several feet in length and, being water-tight, serve a variety of domestic purposes. Joints from trees of large size cut to short lengths make pails, tubs, pans, and crocks. Smaller canes furnish cups, bottles, and jars. Babies are rocked in bamboo cradles and sleep on bamboo matting. The Chinaman uses a section of bamboo for a pillow and, during a scarcity of rice, eats a breakfast prepared from the seeds of the bamboo. Young shoots are used like asparagus and a fluid collecting at the bottom of the joints hardens into a valued medicine. Bamboos are used for masts of ships, for which several are sometimes lashed together. By boring out the partitions, long canes are used for water pipes for reservoirs and gardens. Bows are made by lashing two bamboo splints together, and slender shoots supply arrows. A joint of bamboo makes an excellent receptacle for papers. Silkworms were first smuggled out of China in a joint of bamboo. Oriental people make beautiful bamboo chairs,

baskets, cages, and wicker work of many kinds. Paper is made from the inner wall of the cane, and the outer wall is so flinty that it may be whittled into reasonably serviceable knives. A vast amount of bamboo is imported into Europe for umbrella handles, walking sticks, split-bamboo fishing rods, basketry, and wicker work. While bamboo is not indispensable, in the sense that its place may not be filled by steel or some other form of iron, we may say that it is one of the most serviceable plants known and that it meets the present wants of the people in the most densely inhabited parts of the world.

Ban, a term akin to banner, meaning to publish or proclaim. Instead of obtaining a license from the clerk of the court, it was formerly the custom, both in Great Britain and the United States, for those intending to be married to have their bans proclaimed in church a few weeks before the wedding. Any having objections to the marriage were called upon to "forbid the bans," or ever afterward hold their peace. The custom still prevails in the Catholic church. In history the term has, however, a somewhat different significance, a ban being equivalent to a sentence of outlawry. One who had been "banned," or placed under the ban of the empire, might be killed like any wild beast. Chambers gives the following formula employed on such occasions:

> We declare thy wife a widow and thy children orphans; we restore all thy feudal tenures to the lord of the manor: thy private property we give to thy children: and we devote thy body and flesh to the beasts of the forest and the fowls of the air. In all ways, and in every place where others find peace and safety, thou shalt find none and we banish thee into the four roads of the world—in the devil's name.

Bana'na, a tropical plant much prized for its fruit. Botanically speaking, it is a small-fruited form of the tropical plantain, of which Humboldt says an acre will produce as much food as forty-four acres of potatoes or one hundred thirty-three acres of wheat. Members of the plantain family are raised usually by planting suckers that spring from the base of an old plant. The leaves of a plantain enwrap each other at the base, forming a false stalk, in the larger kinds fifteen or twenty feet high, from which the leaf blades, often ten feet long and three feet wide, droop away gracefully. These false stems get their growth in from eight to fifteen months. They enwrap a flower stem that produces large spikes of flowers which are followed by hands of fruit. These hands form a large, heavy bunch which lops over and hangs downward. The plantain fruit of the Pacific islands varies in shape from the cucumber form of the banana, with slight angles, to a form almost globular. Frequently they are boiled or fried like potatoes and grated or ground for flour. Cloth may be woven from the thready part of the leaves. Cooking plantains from British Honduras reach the markets of New Orleans and are gaining in popularity as vegetables.

There are, in all, over forty species of plantain. Two of the species produce the sweet, seedless fruit known as bananas. One dwarf species is raised chiefly in the Canary Islands for the London market. It grows also in Africa. The species of plantain known as the commercial banana is cultivated chiefly in Central America and the West Indies. A strip along the very edge of the United States from Florida to California is sufficiently free from severe frosts to encourage small plantations, but the small states of Central America are the great shippers of bananas. Bananas are raised with little labor. A few acres of jungle must be cleared and plowed or grubbed up. Banana shoots are planted usually about twelve feet apart, though some planters set them in clumps twenty-five feet apart. They soon shade the soil completely. Each plant bears a bunch of bananas yearly. As soon as the fruit is cut off the stem is cut down. A circle of suckers starts up at once. About all the banana planter has to do is to market his bananas and thin out the suckers. His plants reach maturity irregularly, thus yielding a perpetual crop. The banana plant has few diseases. Were the climate more endurable, banana raising would be an easy way of making a fortune.

The marketing of bananas is an easy matter, and yet it is a business requiring

skill and celerity. Green bananas require neither crates nor barrels, but should not be bruised. They ripen rapidly in transit, but they may not be carried in cold storage; for, if a banana be cooled below 50° F., the process of ripening is checked and the flavor is destroyed. If a banana were ripe when it left Costa Rica, it would not keep long enough to reach the market. Bananas must be cut green and sent to ripen on the way. The business of buying and marketing is in the hands of large companies. Spur railway tracks lead into the hearts of banana plantations. Word comes to the planters by telephone that a ship load is wanted on the morrow. The plantations wake up. The green bunches, varying from thirty to one hundred pounds in weight, are placed in freight cars standing in the fields and are hurried off to the coast and, within possibly twenty-four hours after the order has come, 30,000 bunches have been cut from the stalk and stowed in the hold of a ship bound for Mobile, New Orleans, Galveston, or some other Gulf port. In port the bunches are unloaded by laying them in the pockets of a hugh canvas carrier, that runs like an endless belt, and elevates the bananas at the rate of 2,500 bunches an hour. They are then sent in car lots to wholesalers in interior distributing cities who deliver bunches to local customers or send them out by train to retailers in every town and hamlet in their territory. A bunch of bananas, once cut off by the swinging machete (mȧ-shā′tā) of the swarthy peon, loses no time by land, sea, or rail in hurrying to the window of the village grocer.

Banana raising as an industry is yearly increasing in importance, and one result of the increase is the improvement in the quality of the product. The latest figures available give $19,088,000 as the value of the bananas imported into the United States. Mexico has recently come to the fore as a producer of bananas; and as Mexico is the closet producer to the United States, bananas from that country easily find a market. The latest statistics give 1,345,709 bunches as the annual Mexican banana imports into the United States.

See PANAMA, TARANTULA, SISAL.

Banbury, a town of Oxfordshire, England. It is situated on the Cherwell, twenty-two miles north of Oxford. It is a town of about 13,000 people. Banbury of Merrie England was a noted market town. Banbury ale and cakes were famous. Banbury cheeses were so thin that they were "all paring." Shakespeare aludes to persons as thin as a Banbury cheese. The town appears to have been a Puritan stronghold, at least the expression "Banbury saint" and "Banbury man" were used to denote a Puritan. The customary cross that stood in the old open air market of Banbury is famous in nursery rhyme. It was taken down sometime during the reign of Elizabeth, but it is still celebrated in the nursery rhyme:

Ride a cock horse
To Banbury Cross,
To see an old woman
Upon a grey horse,
With rings on her fingers
And bells on her toes,
She shall make music
Wherever she goes.

Ride a cock horse
To Banbury Cross,
To see what Tommy can buy
A white penny loaf,
A white penny cake,
And a twopenny apple pie.

Bancroft, George (1800-1891), an eminent American historian. He was born at Worcester, Massachusetts, in 1800, and died at Washington in 1891. His father was a Unitarian clergyman. Bancroft was educated at Phillips Academy, Exeter, and at Harvard University. He was sent abroad to study, and to make the acquaintance of eminent European professors. He received the degree of Ph. D. at Göttingen in 1818. Among the acquaintances formed were Humboldt, Goethe, Hegel, and Wolf. After his return he held various educational positions, but became interested in political life, being an ardent supporter of the Democratic party. President Van Buren appointed him collector of customs at Boston; under Polk he was secretary of the navy, and was instrumental in establishing the naval academy at Annapolis, Maryland. He favored the annexation of Texas. At other times he represented his

country at the courts of Great Britain, Russia, and Germany. During all these years Bancroft was ransacking dusty archives at home and abroad and reading faded documents. He was collecting material for the great work by which he is known, a *History of the United States,* from the discovery of America to the formation of the Constitution. Other historians have had access to information not at his command, but his history will always be regarded as a monument of American scholarship. We make room for a short passage:

> Darkness closed upon the country and upon the town; but it was no night for sleep. Heralds on swift relays of horses transmitted the war message from hand to hand, till village repeated it to village; the sea to the backwoods; the plains to the highlands.
>
> The Alleghanies, as they listened, opened their barriers that the "loud call" might pass through to the hardy riflemen. . . . Ever renewing its strength, powerful enough even to create a commonwealth, it breathed its inspiring word to the first settlers of Kentucky; so that hunters who made their halt in the matchless valley of the Elkhorn commemorated the nineteenth day of April by naming their encampment Lexington.

Bancroft, Herbert Howe (1832-), an American historian. He was born at Granville, Ohio. At the age of twenty he established a bookstore in San Francisco. He became interested in Spanish-American history and began the collection of books. He purchased a large part of the library of Emperor Maximilian of Mexico and the library of George Squier, an archaeologist who had conducted extensive explorations in Central America. In all, Mr. Bancroft collected over 60,000 volumes. He reduced this vast mass of material into something like a system by preparing an elaborate index. He then set about the preparation of a history of the Pacific coast from Alaska to Central America. Mr Bancroft died in 1918.

> From twelve to twenty accomplished linguists, we are told, have been constantly employed in Mr. Bancroft's service since 1869. Secretaries have all this time been reading, translating, summarizing, cataloguing and indexing the whole collection. The result attained at the cost of half a million dollars, is a mass of systematized information, such as must make the users and the desirers of historical materials elsewhere deeply envious. . . . Mr. Bancroft has prepared from these materials, and published, a gigantic *History of the Pacific States of America* in thirty-four unusually large volumes.—J. F. Jameson.

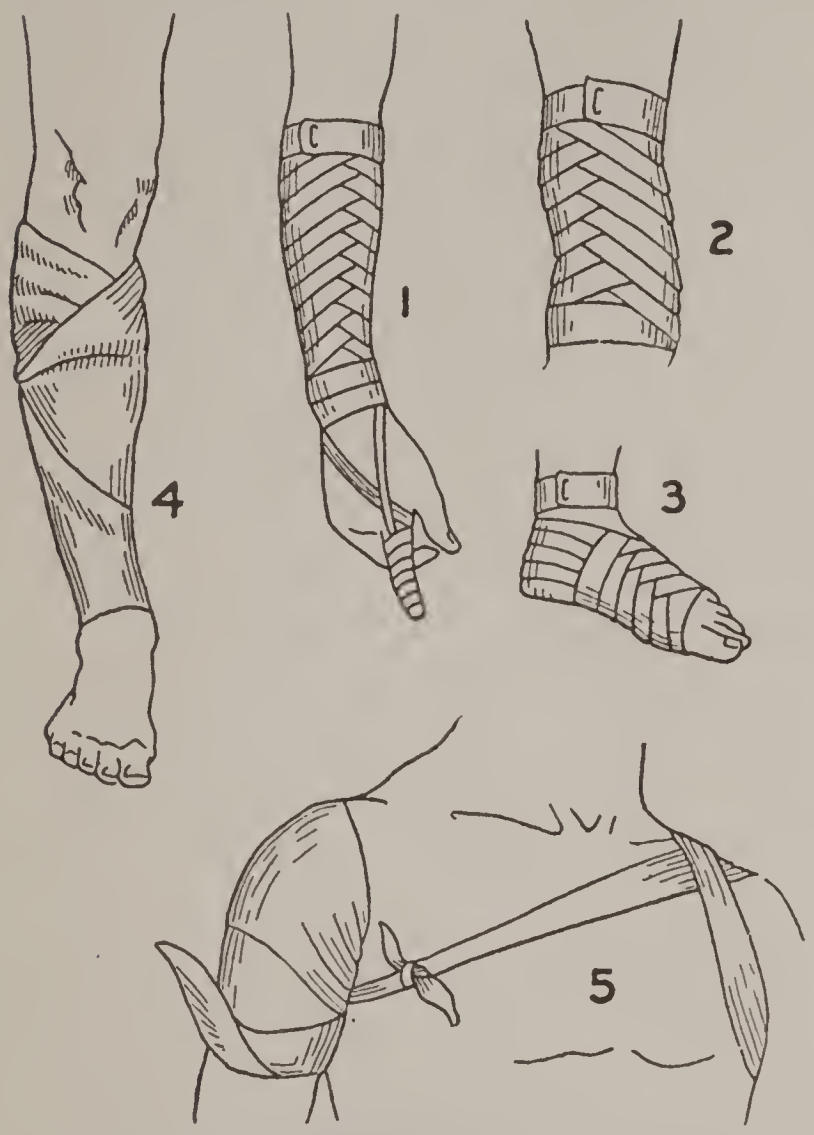
Band. In a general sense, a combination of instruments organized for the playing of instrumental music. In modern terminology, a grouping of instruments played on the march, and usually striking the keynote of a military parade. In modern military usage it is a development of the brass band. Until the thirteenth century there had been no effort toward uniting individual players into an organization. The first attempt was the forming of trumpeters and pipers into guilds, and the first of these was probably the Brotherhood of Saint Nicholas, which was organized in 1228 in Vienna. These guilds grew into town bands throughout Germany.

The bands of today may be grouped as follows: (a) drum and fife, or drum and bugle; (b) brass band; (c) military band. The military band is the more important modern form of the town band. One of the great bands of the world is the United States Marine Band at Washington, which was brought to its high state of perfection under the leadership of John Philip Sousa. The band of the French Garde Republicaine is another of the famous bands of the world.

Bandage. A strip of material in use by surgeons to apply pressure on a part or to retain dressings in place. The principal bandages are the roller and triangular, and from these spring many deviations. Commonly, the bandage is a strip of linen, muslin, cheese-cloth or flannel, from 1 to 5 or more inches wide and up to 10 yards long, depending on where it is to be used; this is rolled lengthwise, and is known as the roller bandage. It is applied spirally, each turn overlapping the preceding one about one-third of its width, and adjusted to widening or tapering by reversal or turning back upon itself. If properly applied, it should give an even, uniform pressure. The spica bandage is used at the junction of a limb with the body.

There are bandages for special purposes, such as the four-tailed, for the head or knee, used for keeping poultices in place, etc., which consists of a piece of cloth split on each side toward the center. When ap-

plied, the ends are crossed and tied so as to form a cap. Roller bandages of crinoline, filled with fresh plaster of paris, are used in making plaster splints. These are first wet thoroughly and then rapidly applied. Bandages of starch, dextrin and silica are much used to give firm, immovable dressings.



BANDAGES
1, 2, 3, Roller Bandages; 4, 5, Triangular Bandages

Bandana, a handkerchief of silk or cotton, having a ground of red, blue, or purple, ornamented with a pattern in white. In certain localities, bandanas are used as neckerchiefs, and as head wraps for women. For the latter purpose, they are knotted sometimes into turbans or caps. The word bandana is from a Hindu word signifying a method of dyeing, which consisted in a skillful tying of certain parts of the cloth, thus preventing those parts from being affected by the dye. The "bandana style" is a term used in the printing of textiles, and denotes the method used to dye and print bandanas. The handkerchiefs are first dyed a solid color. The pattern to be used is cut out of leaden plates. A smooth pile of handkerchiefs is laid between two of these plates and subjected to enormous pressure, sometimes exceeding 500 tons. While under pressure a "discharging" fluid is allowed to run over the top plate. The fluid is prevented by the pressure from reaching any part of the fabric except that between the open figures of the pattern cut in the plates. The color is thus "discharged" in the form of the pattern. If a pattern in colors is desired, the color is printed upon the white spaces after the process described above is completed. With proper conveniences four men can print 19,000 yards of bandanas in ten hours. See PRINTING; DYEING.

Banff, Alberta, one of the most famous resorts in America, visited each year by thousands of tourists who come to see the beauties of Rocky Mountains Park, the heart of the Canadian Rockies. Banff is unique among cities, for it has no elected officials; all control is in the hands of the park superintendent, an officer appointed by the Dominion government, which owns the town site and leases parts of it for private purposes. Banff was first settled in 1893, and was named for the Scotch town which was the home of Baron Mount Stephen. It lies at an altitude of about 4,500 feet, on the main line of the Canadian Pacific Railway, whose great hotel is the principal feature of the town. Calgary is eighty-two miles east, and the Alberta-British Columbia boundary is fifteen miles west. Normal population about 1,000.

Bangkok, the capital city of Siam. It is situated on the Menam River, about twenty miles above its mouth. A central portion of the city lying on the east bank is surrounded by a wall twelve feet thick and surmounted by towers. The rest of the city stretches along on both sides of the river for miles. The ordinary buildings are constructed of bamboo. The streets are intersected in every direction with canals. Many of the houses are built on piles. A very considerable part of the population lives in house boats. Seen from the river the appearance of the city is striking. There are over a hundred Bud-

dhist temples, including one in which a jasper statue of Buddha may be seen. The Great Pagoda is one of the wonderful buildings of the East. The king's palace and grounds include a private temple, offices, the royal seraglio, stables for the sacred white elephant, etc. There are about twenty-six rice mills in the city. The city trades with Singapore, Hong Kong, and European ports. Silk and cotton goods, kerosene, sugar, opium, cutlery, and machinery are the chief imports. Rice, teak and other woods, pepper, hides, lac, birds' nests, and many forest products are exported to the value of $25,000,000 a year. The city has a large trade up and down the river. There are two railways. Telegraphic communication has been established with outlying parts of the kingdom. The business portion of the city has postal delivery and a system of gas lighting. The population according to the census of 1921 was 931,171.

Bangor, băn′gôr, a manufacturing city of Maine, the county seat of Penobscot County. It is situated about sixty miles from the river's mouth, but as the harbor is accessible in the open season to all except the very largest shipping vessels, it has the advantages practically of a seaport. It is one of the largest lumber stations of the world. A dam across the river affords water power for the manufactures, which include flour and dairy products, shoes, clothing, furniture, trunks, carriages, and farming implements. There are also foundries, pork-packing houses and ship yards in the city. Its population in 1920 was 25,978.

Bangs, John Kendrick (1862-1922), an American humorist, editor and lecturer. He was born at Yonkers, N. Y. At Columbia College, from which Mr. Bangs was graduated in 1883, he edited the *Acta Columbia* and first became known for his gift of humor. Later, he was associated with *Life, Harper's Weekly,* the *Metropolitan Magazine,* and with *Puck.* Among the 40 or more humorous works that have endeared Mr. Bangs to the American people are *Coffee and Repartee, The Idiot, A House Boat on the Styx, The Pursuit of the House Boat. Tiddledywinks Tales, In Camp with a Tin Soldier,* and *A Rebellious Heroine.*

Banjo, a stringed musical instrument. The body of the banjo is much like the tambourine, consisting of parchment stretched over a hoop; the head and neck are like those of the guitar. There are five strings usually, sometimes more, played by twitching or striking them with the fingers of the right hand and stopping them with the fingers of the left hand. The banjo is a favorite instrument among the negroes of the South, its tinkling melody, sweet and lively, but plaintive withal seeming peculiarly suited to the negro temperament. The name banjo is a negro corruption of the word bandore, which is from the Spanish name of a three stringed instrument.

"When shall I see the bees a humming
All roun' de comb?
When shall I hear de banjo tumming
Down in my good ole home?"

Bank, an institution devoted to the handling of money. The term is derived from the *banca* or *banc* on which the Italian moneychanger sat. The name has been extended to the office in which a banking business is carried on. It is applied also to the business organization itself. The first public bank is said to have been established in Venice in 1550. The early bankers were Jews.

Banks are open usually in the middle of the day, or from nine to four. The morning and evening hours are required to check up accounts and to see that no mistakes have been made. Banks are closed on Sundays and on bank holidays. New Year's Day, the Fourth of July, Christmas Day, and Thanksgiving are bank holidays everywhere. The anniversary of Lincoln's Birthday, and of Washington's Birthday, Labor Day, Good Friday, Decoration Day in the North, and Memorial Day in the South, are observed in most of the states. A note falling due on any of these dates is payable on the preceding day.

There are several sorts of banks. Private banks are owned and managed by individuals, just as any other business would be managed. They are dependent entirely upon the degree of confidence which the public may have in the proprietors. There

are not far from a thousand private banks in the United States. Some states forbid private banks.

State banks are organized under the laws of the respective states. They are subject to inspection by the state examiner. They are required to keep a certain percentage of their deposits on hand. The proportion of their capital banks are permitted to loan is limited by law; also the amount an officer or director may borrow. Some states forbid the loan of money on real estate, because it requires too much time to get it in again in case it should be needed to pay depositors. There are between four and five thousand state banks with total deposits reaching into ten figures.

Savings banks may be divided into two classes. All the profits made by mutual savings banks are distributed among depositors. The directors serve frequently without pay until a bank's earnings have reached a certain percentage of its deposits. Other savings banks are operated by stock companies for profit. Almost all state and national banks have savings departments. The distinguishing feature of savings banks is that of paying a low rate of interest on deposits and of loaning the same on the best of security. Wage earners and others are invited to make small deposits as often as possible. A well managed savings bank does much to encourage thrift and economy. There are over a thousand savings banks in this country with aggregate deposits exceeding those of state and private banks put together. The loan and trust companies belong to this class of institutions.

National banks were first organized under a congressional act of June 3, 1864. According to its provisions as amended by subsequent legislation, at least five persons must associate and pay in a capital of not less than $25,000. National banks are required to invest a certain proportion of their capital—one-fourth when the capital of the bank is $150,000 or less, and one-third when the capital exceeds that amount—in United States bonds. These bonds must be deposited in the national treasury as security for currency the bank is authorized to issue. A bank may isssue paper money up to the full par value of the bonds deposited with the government. The government prints all bank notes, and redeems them in case of the bank's failure. There were, in 1917, 7,589 national banks having a capital of more than $1,000,000,000 and a surplus of nearly $800,000,000.

Banks, Federal Reserve, a system of banks authorized December 23, 1913. The act provided for reserve banks located at central points throughout the United States. The organization was perfected and on November 16, 1914, the banks were officially open for business.

These banks are located in the following cities: Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas and San Francisco. All national banks must become members or stockholders in these banks and state banks may also. Each member bank must hold stock to the amount of six per cent of its own stock.

These banks are governed by a Federal Board, consisting of the Secretary of the Treasury and Comptroller of Currency ex-officio, and five other members appointed by the President of the United States for a term of ten years, the term of two to expire each two years. The salary of these members is set at $12,000 per year.

The separate banks are each governed by a board of nine members who shall pass on all actions of the local bank, subject to the rules of the general board.

These banks are really bankers' banks and do no business with the general public. Provision is made whereby member banks can re-discount commercial paper and obtain funds for movement of crops and other legitimate operations. Funds may also be transferred from one branch to another when there is need for this.

The plan provides elasticity in our currency system and prevents panics.

See MONEY; MINT; GOLD; SILVER; GREENBACKS; CLEARING HOUSE.

Bank of England, the principal bank of London, the greatest banking establishment in the world. Seen from the outside, it is a large, irregular, one-story building covering about four acres. It is surrounded

entirely by streets. For the sake of security, the outside walls are without windows. The offices are lighted from inside courts. Visitors and those having business enter through a guarded gateway in Threadneedle Street, whence the bank is called the "Old Lady of Threadneedle Street." It was founded in 1694 by a shrewd Scotchman named William Paterson, who obtained a royal charter, conferring power to issue paper money. It is still the only bank in London having that authority. The bank is a joint stock affair. The original capital was 1,200,000 pounds. Nine hundred employes are paid salaries varying from $250 to $6,000. The vaults contain usually from $75,000,000 to $100,000,000 of gold and silver. This is about equal to the value of the Bank of England notes in circulation. The bank receives a grant of $1,000,000 a year for managing the national debt. This is a large sum to receive in a single commission, but it amounts only to one-thirty-eighth of one per cent. The bank does the usual banking business, receiving deposits, cashing checks, and making loans. It is under obligation to buy all the gold bullion offered at a price fixed by Parliament. The business of the bank amounts to about $10,000,000 a day. It has its own printing room for the making of blank books and the printing of its own paper money. A bank note is never reissued. Even though a customer receive the note at one window and pay it in at another, it is cancelled. The notes taken in each day are laid away carefully for ten years, in case they may be needed as evidence in some lawsuit. Each month a little furnace holding several bushels is stuffed full of the notes taken in ten years before. See WALL STREET.

Bankruptcy, failure in business; inability to pay one's debts. The Italian money changer sat on a "banca" or bench. When he failed his bench was broken up or ruptured, and he was a bankrupt. Punishment for debt was formerly very severe. The Hebrew's wife and children were sold into slavery to pay debt. In Rome an unfortunate debtor became the slave of the man he owed. In England one who failed to meet his debts was ordered by the court to pay, and if he neglected to do so, he was thrown into prison for disobedience, —so ran the legal fiction,—and stayed there at his own expense for food, fire, and clothing until, by compromise with his creditors or in some other way, he carried out the order of the court. The cruel spirit of 1663, the age when Carolina was peopled by debtors, is expressed by Justice Hyde in these words: "If a man is taken, and lies in prison for debt, neither the plaintiff, at whose suit he is arrested, nor the sheriff who takes him, is bound to find him meat, drink, or clothes. He must live on his own, or on the charity of others, and if no one will relieve him, let him die in the name of God, says the law, and so say I." See Dickens' *Little Dorrit* for an account of life for twenty-three years, father and child, in the debtors' prison at Marshalsea.

It does not appear that the American colonists enacted laws for the imprisonment of debtors, but the practice prevailed. Authorities threw debtors into prison, just as a matter of course, in accordance with the English custom, under what is known as common law. Excessive cruelty does not appear to have prevailed in this country, and yet it is not pleasant reading to know that Robert Morris, the financier of the American Revolution, was thrown into prison for his debts, and died there. Whittier has expressed his indignation in *The Prisoner for Debt.* In later days merciful views have prevailed. By giving over all his property, a business man may receive a discharge from legal obligations, and may start anew in the world. Many have in this way built up new fortunes, and have turned back in a spirit of honor and have paid up old obligations.

Our constitution gives Congress authority to enact bankruptcy laws. Three such laws, 1800, 1841, 1867, were passed and subsequently repealed. In the absence of a national law, laws were enacted by each state. Under a new federal law taking effect July 1st, 1898, any person may appeal to the federal court for the division of his property among those he owes, and for permission to begin again

free from debt. Anyone who has gotten into debt to the extent of a thousand dollars, and who is not a wage earner, is not a tiller of the soil, can be brought into court, and can be forced to assign his property for the benefit of his creditors in any one of the following cases:

(1) His having concealed or transferred any of his property with intent to hinder, delay, or defraud his creditors.

(2) Transferring any of his property to a creditor to give him an advantage over other creditors.

(3) Suffering a creditor to obtain an advantage over other creditors by legal procedure.

The creditors, or the court, appoint a trustee whose duty it is to convert the bankrupt's property into cash and distribute it ratably. At the proper time the bankrupt is discharged, and may not be held for old debts. Bankruptcy proceedings begun under state laws prior to July, 1898, were, of course, finished under state law. All state laws relating to bankruptcy are now suspended, but they would come into effect were the federal law repealed.

The number of American bankruptcies and the total amount of liabilities may be read by years:

Year	Number	Am't Liability
1918	9,982	$163,019,979
1919	6,451	113,291,237
1920	8,881	295,121,805
1921	19,652	627,401,883

Bankruptcy in Canada. The British North America Act of 1867 authorizes legislation by the Dominion parliament on the subject of bankruptcy, but there is now no Dominion law in force. Such an act was passed a few months after the formation of the Dominion, and it was repealed in 1880, chiefly because it was in conflict with provincial laws which had previously been in effect. An act applying only to banks, insurance companies and similar institutions was passed in 1882, but with this exception the regulation of bankruptcy has been left to the provinces. In Quebec, where the French civil code is still law, a debtor may "abandon" his property, but he is thereby relieved of his debts only to the amount which his creditors realize from it. In Quebec a creditor with a claim of not less than $200.00 can compel abandonment, but in none of the other provinces is there any procedure by which a creditor can compel a debtor to make an assignment. A debtor may, however, make a voluntary assignment of his property to his creditors or for their benefit, but if the amount realized from its sale is not enough to pay everybody in full he is still under that obligation. If a debtor refuses to make an assignment, the creditor has no course except to bring suit and obtain judgment. Judgments are paid in the order of priority.

Banks, Sir Joseph (1743-1820), an English naturalist. He was a native of London and was educated at Oxford. He inherited a fortune and gave himself to an enthusiastic study of natural history. He was made a fellow of the Royal Society in 1766. He sailed with Captain Cook 1768-1771 in his famous voyage around the world, returning with a fine collection of plants and animals. He was made president of the Royal Society in 1777, a position which he retained forty years. In 1781 he was made a baronet.

Bannockburn, a Scottish village three miles southeast of Stirling on a rivulet of the name. The name is derived evidently from bannock, a Scottish cake of unleavened oat or barley meal, baked on a hot griddle, and from burn, the Scottish name for a small stream. The battlefield of Bannockburn is one of the most celebrated in Scottish history. It was here that Robert the Bruce defeated the English forces under Edward II of England, June 24, 1314. Bruce is thought to have had about 30,000 men and Edward about 100,000. Bruce disposed his small army most skillfully, and rendered the English cavalry useless by digging a large number of pits, in the bottom of which sharpened stakes were driven. These pits were so concealed by brush and grass that the English horse was afraid to venture among them. Among the traditions of the battle is one to the effect that, just before charging the English lines, the handful of Scotch soldiers pulled off their blue bonnets and knelt in prayer. The English monarch thought that they were making

submission to him, but was soon undeceived. At the critical moment a horde of camp followers appeared on an elevation behind the Scottish forces, and struck terror into the English, who thought that large reinforcements for the Scots were coming. The rout of the English was complete. The battle secured the independence of Scotland.

At present the village has about 2,000 inhabitants with prosperous manufactories of carpets, tartans and woolen cloth besides a number of other industries. Many tourists visit the battlefield. See BRUCE; SCOTLAND; STIRLING.

Banquo, băn′kwō, in Shakespeare's tragedy, *Macbeth,* a general in the king's army, of equal rank with Macbeth. The "Weird Sisters" prophesy that Banquo's descendants shall reign. Macbeth therefore hires assassins to slay him and his son. The son, however, escapes with his life. In one of the most powerful scenes of the play, the ghost of Banquo appears to Macbeth in the seat reserved for Banquo at a banquet, but is invisible to the other guests. See MACBETH.

Bantam, a well known variety of the domestic fowl. It was brought originally from the East Indies and is supposed to take its name from the seaport of Bantam, Java. The bantam weighs about a pound, not being much larger than a quail; but it is so full of fight that it drives ordinary fowls of five times its own weight. A small person of great pugnacity is not infrequently called a "bantam" in derision. See CHICKEN.

Bantu, in African geography, a general term for a vast number of negro tribes and languages. The other great group of negroes is the Nigritic or Sudan. The Hottentots, Bushmen, and pygmies are excluded from both groups. In general, the Bantu tribes inhabit that part of Africa lying south of the Sudan and Abyssinia. The Congo, Kaffir, and Zulu negroes are of this stock.

Banyan, a tree of India. The banyan tree is noted for rooting branches. The main tree throws out vast branches at a great height like our hardwood trees. The lower and horizontal branches let drop slender shoots, which no sooner reach the ground at a distance of several yards, it may be, than they take root and form new stems, sending out branches at the top like those of the parent tree. In this way a single tree becomes a mountain of foliage, resting on a multitude of trunks which serve as supporting columns. Nearchus, the general of Alexander who conducted an expedition to the East, reported that he found a tree in India large enough to shelter an entire army. Seven thousand persons are known to have encamped under a banyan tree supposed to be the one described by Nearchus. A banyan tree, thirteen feet in diameter, in the botanical garden of Calcutta, has been described as having a main stem and 3,000 smaller ones. While the banyan grows throughout extensive areas and is not useless, it is regarded rather as a curiosity than otherwise. Hordes of chattering monkeys feed on its leaves and berries, and share its shelter with bright colored birds and enormous bats.

Baobab, bā′ō-băb, a tropical tree of western and southern Africa. A baobab tree in its glory forms a low, broad, hemispherical mass of green, perhaps sixty feet high and one hundred and fifty feet in diameter. The trunk of such a tree is thirty feet in diameter, half as thick as it is high. It has been called the largest known tree, but must yield this honor to the eucalyptus, or to giant trees of California. Large white flowers hang in drooping clusters a yard long. The fruit, called monkey's bread, supports a crowd of these animals. It is useful to travelers to quench thirst and ward off pestilential fevers. Livingstone speaks of this tree in his South African travels.

Baptism, a rite or ceremony by which a person is initiated into the Christian church. It consists in the application of water, either by pouring or sprinkling it upon the head, or by the immersion of the entire body. The term Baptism is derived from a Greek word, which means to dip or wash. The application of water is symbolic of cleansing from sin.

The origin of the rite is not definitely known. Christian theologians quote the

authority of the New Testament. Jesus himself was baptized by John the Baptist, in the River Jordan, and enjoined upon his apostles the duty of baptizing converts. It is probable, however, that the rite in some form was used long before. Much older than Christian baptism was a Pagan custom in parts of northern Europe which involved the use of water in naming a child. The newly born infant was presented to the father who decided whether it should be reared, or exposed to death. If he decided that the child should live, he poured water upon it, giving it a name. After this ceremony to expose the child became a crime, but before it the father's right to decide the matter was unquestioned. Baptism in the early Greek church was called by many names, as "regeneration," "illumination," "mystery," "seal of the Lord," all of which indicate a profound belief in an inward spiritual change as the effect of the outward ceremony. Baptism came thus to be looked upon as sacred. It is still a sacrament of the church in all sects which acknowledge sacraments.

The subject of Baptism is one which has occupied theologians since the early days of Christianity. The origin of the rite, questions as to its form and its meaning, have given rise to endless discussions and controversies, and whole libraries have been written upon the subject. See BAPTISTS.

Baptist Young People's Union of America, a federation of Baptist young people, organized July 7, 1891. The purposes of the organization and its methods are closely allied to those of the Christian Endeavor Society, and the Epworth League. There are branch societies in nearly every state and territory. The Union has its headquarters at Chicago. See CHRISTIAN ENDEAVOR; EPWORTH LEAGUE.

Baptists, a large religious denomination. The sect originated in England during the reigns of Henry VIII and Elizabeth, and has spread throughout all parts of the English speaking world. It is difficult to state a religious belief in a few words. The Baptists inherited a reverence for the Scriptures and a Trinitarian faith from the Church of England. The denomination holds that baptism is a holy ordinance requiring an intelligent faith on the part of one who is baptized, and may therefore be administered only to adults. Infant baptism is, in their judgment, only a christening or naming, a dedication of the child by its parents, not the offering of one's self implied in baptism. Immersion is the form of baptism generally preferred. In Great Britain and Ireland at the present time there are about 3,000 Baptist churches with a membership of one-third of a million. One of their most noted men was the late Rev. Charles Spurgeon, whose mammoth tabernacle and work in London have a world-wide reputation.

Roger Williams, who was expelled from Massachusetts Bay Colony in 1635, is considered the founder of the Baptist church in America. In Boston, as late as 1661, Baptists were sentenced to be fined and "well whipped." In 1678 the doors of their meeting house were ordered nailed up by the court.

RECENT STATISTICS. This denomination is now composed of three main groups: The Northern Convention, the Southern Convention, and the National Convention (colored). The report for 1921 shows a total membership in the United States of 7,943,331; 59,744 churches and 42,088 ordained ministers. In the Northern Convention there were 8,409 churches, 8,566 ordained ministers and 1,253,878 members. The Southern branch had 29,551 churches, 15,551 ordained ministers, and a membership of 3,434,246. The National Negro Convention had 20,486 churches, 17,103 ministers, and a membership of 3,116,325.

In Canada there are about 1,302 churches with a membership of 138,882 and 868 ministers. There are numerous smaller branches of the denomination, and all of these have separate organizations and carry on extension missionary work.

up by the court.

Barbados, bär-bā′dōz, an island of the West Indies. It belongs to the United Kingdom. It lies at the eastern entrance to the Caribbean Sea and is the headquarters for British troops in the West

Indies. The entire area is about 166 square miles. The population is 196,000. The capital is Bridgetown with 35,000 people. About 100,000 acres are under cultivation, planted chiefly with sugar-cane. The island is well provided with churches, schools, and courts. There are well built wagon roads, telephone lines, and one narrow gauge railway, twenty-one miles in length. The little island publishes several newspapers, including three dailies. The exports are sugar, rum, petroleum for fuel, vegetables, and fish.

Barbara Frietchie, a patriotic poem by John G. Whittier, written in 1863. The poem is based on an incident supposed to have occurred at Frederick, Maryland, during the Civil War. Doubt has been expressed by many as to the truth of the story. Lossing, none too accurate, in his *Pictorial History of the War,* accepts it as fact. The poem is partisan. Terms are used that Whittier would have avoided when the years of strife were over, but the lines are spirited and give credit for character on both sides of the contest. Early in September, 1862, General Lee swept into Frederick City on the march that led to Antietam:

Forty flags with their silver stars,
Forty flags with their crimson bars,

Flapped in the morning wind; the sun
Of noon looked down, and saw not one.

Up rose old Barbara Frietchie then,
Bowed with her fourscore years and ten;

Bravest of all in Frederick town,
She took up the flag the men hauled down;

In her attic-window the staff she set,
To show that one heart was loyal yet.

Barbari, bar'ba-ri, the name given by the Greeks to all foreigners whose language was not Greek. Such foreigners were regarded invariably as of inferior race. The Romans called all people who spoke neither Greek nor Latin Barbari.

Barbarossa, Frederick I, Emperor of Germany. The term means "red beard." See FREDERICK BARBAROSSA.

Barbary, in geography and history, a general term applied to the northern coast of Africa from Egypt to the Atlantic. The name is derived from the Berbers, an ancient people who were subjugated by the Arabs. See ALGIERS; MOROCCO; TRIPOLI.

Barbecue, bär'bē-kū, a West Indian word applied to a platform of sticks, supported by posts. It is interesting to trace the history of the word. In Cuba, it is a platform of poles on which corn and fruits are stored. Next it is a scaffold on which to dry or smoke fish and fresh meats. Then a huge gridiron on which joints of meat may be roasted. Still later it is the carcass of a sheep, hog, or ox roasted whole, and finally a large social or political meeting at which a barbecued ox forms a prominent part of the entertainment. In the hard-cider, log-rolling presidential campaigns of William Henry Harrison's day, barbecues were a prominent means of awakening jollity and enthusiasm. While the political barbecue has not been abandoned entirely, it is not so popular as it once was. See HECATOMB.

Barber, one whose occupation is to shave or trim the beard and to cut and dress the hair. The term is derived from the Latin *barba,* meaning a beard. Formerly the victim who desired to be shaved sat on a high stool. He held a crescent-shaped or semi-circular basin under his chin, in which the barber made the lather and applied it with his hand. The brush and reclining barber's chair are of recent invention. In early days the business of the barber and surgeon were combined in one. The king's barber-surgeon was a man of eminent attainments. In the reign of Henry VIII the English surgeons secured the enactment of a law that barbers should confine themselves to the minor operations of bloodletting and drawing teeth. Surgeons were forbidden to practice barbery or shaving. The barber's sign or striped pole is a relic of the days when the stripes represented the ribbons or bandage with which the barber wrapped the arm of a patient after letting blood. According to the latest census report, there are 131,116 barbers and hairdressers in the United States. See SURGERY.

Barber of Seville, a comedy by Beaumarchais, produced in 1775. Upon it was based the comic opera of the same name,

by Rossini, produced in Rome in 1816, and a few years later in Paris. This opera was hissed the first night, but has since become one of the most popular light operas. See FIGARO.

Barberry, a low, ornamental shrub, of which there are about one hundred known species, all native to the temperate regions of the eastern and western hemispheres. The fruit of the shrub resembles in size, shape and color the common currant, but is usually too acid to be eaten. It is, however, often used in making jellies. The fruit of one species, native to France, is used for the distillation of free malic acid; and the fruit of another species is sometimes dried and eaten like raisins. The yellow root and inner bark of the barberry is used in dyeing, and the bark is sometimes used in tanning.

Barcelona, a Mediterranean port of Spain. It is situated on a harbor at the mouth of two rivers about one hundred miles from the French frontier. Barcelona was the capital of the ancient kingdom of Catalonia. It is still the seat of the Spanish province of that name. The city consists of a new part and an old. By 1845 the walls that surrounded the old city had been leveled, and the space given over for new buildings. The site of the old citadel was converted into a botanic garden. The streets within the old walls are crooked and narrow. The new city is laid out on the rectangular plan. It is well paved and is provided with electric lights and electric street railways. A mole has been built to protect the harbor. The University of Barcelona, founded in 1430, now occupies buildings in the new city. Barcelona was at one time a rival of Genoa and of Venice. It is still the commercial center of eastern Spain. The city corresponds in Spain, to Marseilles, in France. Barcelona is the most important manufacturing city of Spain. It is the center of Spanish paper making. Esparto is the material chiefly used. There are manufactures also of cotton, silk, and woolen fabrics. Stoneware, soap, chemicals, cannon, firearms, leather, glass, and machinery swell the volume of manufactured products. Barcelona ranks next to Madrid in size. Population of Barcelona in 1900, 533,000.

Bard, a Celtic term applied to a rude poet or minstrel, particularly among the Welsh and Irish. The bard was held in high honor at feasts or solemn festivals. Like the minstrel, he sang or chanted songs composed in commemoration of noble deeds or designed to convey instruction. In Scotland, the term was applied rather to a strolling singer of the vagabond nature. Shakespeare is called the "Bard of Avon," though improperly, if the exact meaning of the term is adhered to. The euphony of the appellation is its only excuse. Burns delighted to speak of himself as a bard. The following motto was prefixed to the Kilmarnock edition of his poems:

The simple bard, unbroke by rules of art,
He pours the wild effusions of the heart;
And if inspired, 't is Nature's powers inspire:
Hers all the melting thrill and hers the kindling fire.

See MINSTREL; TROUBADOURS.

Baring-Gould, baring-göld′, **Sabine** (1834-), an English clergyman and author. He was born at Exeter, received his education at Cambridge, and some years later became rector of Lew-Trenchard in Devon. He is the author of many novels and miscellaneous writings. *Germany Past and Present* and *The Story of Germany* are, perhaps, his best known works. *Iceland, its Songs and Sagas* and *Curious Myths of the Middle Ages* may also be mentioned, and, among his novels, *Mehalah, a Story of the Salt Marshes, The Broom Squire,* and *Miss Quillet.*

His secret of popularity lies not in his treatment, which is neither critical nor scientific, but rather in a clever, easy, diffuse, jovial, amusing way of saying clearly what at the moment comes to him to say.—Warner's *World's Best Literature.*

Mehalah is still one of the most powerful romances of recent years.—J. M. Barrie.

Barium, a metallic element closely related to calcium, and hence to lime. The name was proposed by Davy. It is Greek, meaning heavy. It is doubtful whether barium has ever been seen in a pure state. It is variously described as silver-white, golden-yellow, and bronze. It is known

to be ductile and malleable. Its specific gravity is about four, that is, it is about four times as heavy as water. A hydrate or combination of barium and water is manufactured at Niagara Falls. It is used in clearing sugar. Barium hydrate unites with lime readily. It is used to soften water, and thus prevent the formation of lime incrustations on the inside of boilers. Barium is used in sizing paper and to adulterate the white lead used for painting. The spectroscope test for barium is a number of green lines. Barium salts are poisonous. See CHEMISTRY.

Barkis, bär′kĭs, **Mr.,** a bashful carrier in Charles Dickens' *David Copperfield.* He is remembered by his famous proposal of marriage to Peggotty, David's nurse. He employs David as his messenger and makes known his intentions in the words, "Barkis is willin'." See DICKENS; DAVID COPPERFIELD.

Barley, a valuable kind of grass. There are about sixteen different species of wild barley scattered over the world. We have one kind in this country called "squirrel tail grass." It is a waste-ground plant, so bearded as to be worthless in a pasture. Cultivated barley originated in Asia Minor where its parent, a four-rowed species, still grows wild. Barley is the favorite food of the famous Arabian horses. It is mentioned frequently in the Scriptures—"A measure of fine barley." Barley was cultivated by the Romans. Specimens of barley have been found in the remains of the lake dwellers of Switzerland. A barleycorn is an old English measure, three barleycorns to the inch. John Barleycorn is the Scottish impersonation of a hilarious time. "Bold John Barleycorn" has been immortalized by Burns.

Owing to the short time required for its growth, barley ripens farther north than any other grain. It also has the power of adapting itself to the hot climate of Arabia and the quick, short summers of Finland and Iceland. It is raised in every European country, including Turkey and its tributary states. The country about Edinburgh lays claim to the finest barley in Europe. Barley is raised in the United States quite generally, but, by reason of its beard, it is so disagreeable to handle and the straw is so objectionable as fodder, that it is not a favorite crop. Transportation has been so cheapened that wheat flour is displacing barley meal in the north of Europe. Were it not that an immense quantity of barley is in demand for malt, it would become an unimportant production. Pearl barley is ordinary barley hulled for table use.

BARLEY CROP OF COUNTRIES NAMED.

Country	1919 Bushels.
United States	165,719,000
Canada	58,336,000
Chile	3,977,000
Belgium	3,617,000
France	23,626,000
Italy	8,327,000
Netherlands	2,688,000
Norway	5,737,000
Spain	79,432,000
Switzerland	625,000
Japan	91,500,000
Korea	26,480,000
Algeria	33,667,000
Tunis	6,110,000
New Zealand	709,000
Comparable totals, 14 countries	487,936,000

Exports—	Bushels.
Algeria	3,743,000
Argentina	218,000
British India	14,848,000
Canada	4,046,000
China	97,000
Denmark	357,000
France	12,000
United Kingdom	44,000
United States	18,805,000

Imports—	Bushels
Argentina	7,000
Canada	1,000
Cuba	273,000
Denmark	12,000
France	10,686,000
Italy	7,510,000
Switzerland	605,000
United Kingdom	11,725,000

UNITED STATES.

State	Bushels
Maine	168,000
New Hampshire	25,000
Vermont	420,000
New York	2,486,000
Pennsylvania	392,000
Maryland	198,000
Virginia	375,000
Ohio	3,150,000
Indiana	1,430,000

Illinois	5,724,000
Michigan	5,320,000
Wisconsin	13,568,000
Minnesota	18,200,000
Iowa	8,032,000
Missouri	330,000
N. Dakota	14,950,000
S. Dakota	19,250,000
Nebraska	5,577,000
Kansas	16,200,000
Kentucky	100,000
Tennessee	176,000
Texas	875,000
Oklahoma	1,500,000
Montana	540,000
Wyoming	525,000
Colorado	3,900,000
New Mexico	680,000
Arizona	1,102,000
Utah	720,000
Nevada	420,000
Idaho	3,360,000
Washington	4,140,000
Oregon	1,886,000
California	30,000
United States	165,719,000

Barley is less liable to disease than other cereals, but it is sometimes attacked by rust and smut. Close smut may be prevented by soaking the seed for ten minutes in a solution of copper sulphate (bluestone), one pound to five gallons of water, or formalin, one pint to thirty gallons of water. See BEER; CEREALS.

See BEER; CEREALS.

Barleycorn, Sir John, a humorous personification of malt liquor. The expression is one of considerable antiquity. Various poets tried a hand at the ballad of Sir John. That by Burns is the best:

There was three Kings into the east,
Three Kings both great and high,
And they hae sworn a solemn oath
John Barleycorn should die.

They took a plough and plough'd him down,
Put clods upon his head,
And they hae sworn a solemn oath
John Barleycorn was dead.

But the cheerfu' Spring came kindly on,
And show'rs began to fall;
John Barleycorn got up again,
And sore surpris'd them all.

. . . . . .

John Barleycorn was a hero bold,
Of noble enterprise,
For if you do but taste his blood,
'Twill make your courage rise.

Barlow, Joel, an American poet and politician. He was born at Reading, Connecticut, in 1755 and was graduated at Yale College during the Revolutionary War. Barlow was a young soldier, a wit, a chaplain, an editor, a lawyer, an agent for a land company, a merchant, an American consul at Algiers, and in 1811 minister plenipotentiary to France. While seeking an interview with Napoleon in Poland, he died in a village near Cracow, 1812. His name appears among the early writers of American verse, as the author of the *Columbiad*. He wrote also a number of humorous poems. The most noted is *Hasty Pudding* from which we quote a few lines:

I sing the sweets I know, the charms I feel,
My morning incense and my evening meal—

. . . . . .

Ev'n in thy native regions, how I blush
To hear the Pennsylvanians call thee *Mush!*

Barmecide, bär'me-sīd, a prince of Bagdad. He is the principal character in a story of the *Arabian Nights*. He called in a beggar and seated him at a bare table, on which he pretended that a sumptuous repast was laid out. Whether because he fell in with the humor of the situation, or was afraid to do otherwise, the beggar pretended to partake of the various viands, and praised their flavor. When the prince had enjoyed himself sufficiently at the beggar's expense, he ordered his servants to bring in a generous meal. One who loudly proclaims his liberality where no favor is conferred is called a barmecide. A barmecide feast is an expressive term applied to a lot of favors that exist only in the mind of the bestower. It is said that the great feasts given by the emperor of China to a vast number of guests are managed on some such plan. The emperor's own table is loaded with genuine delicacies. Other tables are decorated chiefly with papier-maché ducks, wooden chickens, wax fruits, highly colored water, etc., after the style of stage feasts. All this is done by grafting officials desirous of profit. Should any be questioned by the emperor, etiquette requires him to bow low, hand on chest, saying, "Oh, Light of the Sun and Brightest Orb of the Night, your slaves have feasted to satiety." See BAGDAD.

Barn, in agriculture, a building for the shelter of forage and farm animals. In

England the term is restricted to a place of storage for hay, grain, flax, and other farm produce. The word itself is of Old English origin. It comes from *bere* + *ern* and means barley storage. The barn may be regarded as the index of farm prosperity. Sheds of straw and sod stables are well enough for a year or two, but a substantial barn is the ambition of every progressive farmer. Sightly, well kept barns go far to proclaim the prosperity of a community. There is an old saying to the effect that a small house and a large barn indicate thrift; a small barn and a large house are signs of a mortgage and that the farm will soon change hands.

Very likely the first American barns were log affairs. The Canadian and New England barns of the nineteenth century were formed of massive hewn timbers, and were inclosed with boards and roofed with hemlock shakes and shingles. A barn raising required the united strength of many men and was made the occasion of neighborhood jollifications. The growing scarcity of timber and the desire for greater ease in building led to the employment of skeleton frames of dimension stuff. These are known as balloon frames. The farther south the observer may go, the less severe the winters become, and the less substantial the barns are. In the southwest where hay cures on the stalk and cattle live unsheltered all winter, the early settlers felt still less need for substantial barns.

The typical American barn may be said to consist of a ground floor, used for the stabling of horses and cattle, and a loft for the storage of hay and other forage. A central aisle runs the length of the ground floor. Stalls are built along each side of this passage, so that the animals stand with their heads to the wall. A long manger is built in front of the animals, and each stall has a feed box. A huge loft door, often in the gable end, serves to admit hay, which is either pitched in by hand or is unloaded by a traveling hay fork. It would require volumes to describe the departure from this general type. Sheds, lean-tos, L's, half underground basements, etc., may be found in infinite variety.

The greatest advances have been made in barn sanitation. The dairy barn in particular has been provided with a concrete floor that may be flushed; iron partitions, or better, no partitions at all, catch no dust and harbor no insects; mangers are dispensed with in the interest of cleanliness; a flood of light is admitted in remembrance that the cow is by nature an out-door animal, and that germs are killed by sunlight; and ventilation is provided.

One of the most notable features of the later development of the dairy barn—a feature adopted with a view to cleanliness and to the animal's health—is the giving of more room to each head of stock. Yet in order to give this space it is not essential that the barn be materially increased in dimensions, for the reason that the galvanized iron stanchions now used in place of the old wooden stalls do not require the room for their erection that the latter did, and for the further reason that barns are now built on such plans that a single aisle is very often used where two or even three were formerly used. In the circular barns now so often seen the silo occupies the central position, thus reducing the total time required for feeding; and this makes the feeding time of each individual animal simultaneous with all the others.

Modern horse barns are, in general, built of heavier material than are dairy barns, because of the greater weight and activity of the animals to be housed. As in the case of the dairy barn, all possible sanitary precautions are taken, and as in the case of the former, concrete and metal have replaced wood in interior construction. Box stalls have supplanted the old style stalls, and feed boxes and watering troughs are seldom permanently installed, as they retain moisture and are therefore potential disease breeders. The barn is usually of two, though sometimes of three, stories. The topmost of these contains feed storage space, harness rooms and, on large stock farms, light and roomy quarters for the stable attendants.

On farms where usually the same barn houses both cattle and horses, the best features of the horse and cattle barns are combined. The modern tendency seems to

be toward the circular type in these general farm barns.

Barnabas, the surname given to Joseph by the Apostles. He was a Levite, and a native of Cyprus. Barnabas was a fellow-worker with Paul, and is, like Paul, classed as an Apostle. He journeyed with Paul through Asia Minor doing missionary work, and for a year he labored with him at Antioch. Contention arose between Paul and Barnabas after their return to Antioch from Jerusalem. Barnabas was out of harmony with Paul's broader Gentile view of many religious matters, and they finally quarreled over the efficiency as a missionary of Mark, a nephew of Barnabas. Barnabas separated from Paul, taking Mark with him to their Cyprian home. The life of Barnabas after this separation is cloaked in obscurity.

Barnaby Rudge, a novel by Charles Dickens, published in 1841. It is one of the two historical novels which Dickens attempted,—the other being *A Tale of Two Cities.* The story relates to the Gordon Riots, or "No Popery Riots," as they were called, of 1780. Barnaby, a poor half-witted lad, becomes involved in these riots and is condemned to death, but is finally pardoned. The plot of *Barnaby Rudge* is unusually intricate. It has few side issues, and those that appear have a close relation with the main thread of the story. Compared with Dickens' other stories, it offers little opportunity for humor and pathos. It is often regarded, therefore, as less characteristic than his other novels. The interest of the story, however, never flags. The gathering of the mob and the storming of Newgate are intensely dramatic; and in the character drawing Dickens is at his best. Barnaby, foolish and happy, with Grip, the raven, for his one close friend; Dolly Varden; Miss Miggs, and Hugh, the hostler, are vivid pictures. Grip, it is interesting to note, is drawn from life. See DICKENS.

Barnacle, bär'nà-kl, a degenerate marine animal. Barnacles are related closely to the crayfish, but in appearance they more nearly resemble the clam. In fact, naturalists formerly considered them mollusks. There are at least three classes of barnacles. The common barnacle is known also as the ship barnacle and goose barnacle. The second kind is the acorn barnacle. The third class includes a number of small parasitic forms.

The common barnacle has a peculiar life history. Larvae escape from the egg cases of the parent, and, after moulting several times, become very much like little water fleas. After a period of free swimming, the little "flea" settles down, head first, on some floating object to which it becomes firmly glued by a secretion from cement glands. As the body develops, it assumes a stalk-like form from two to several inches in length. The end of the body, the tail end, we should remember, secretes a shell of five valves, giving the barnacle an appearance not unlike that of a clam clinging to an object by a long foot.

In modern phraseology, the term "barnacle" has come to mean any thing or any one that hangs on, and thus becomes an impediment. A needless dependent of any sort, in fact, may be characterized in this way.

Barnard, Edward Emerson (1857-1923), an eminent American astronomer, was born at Nashville, Tennessee, and educated at Vanderbilt University and at the University of the Pacific. In his boyhood, Dr. Barnard learned photography and began his astronomical studies alone. He had advanced so far with his studies by 1883 that he was given charge of the Vanderbilt Observatory, where he worked four years. From 1887 to 1895 he was astronomer at the Lick Observatory, and from the latter year until his death Dr. Barnard was professor of practical astronomy at the University of Chicago, and astronomer at the Yerkes Observatory. In 1892 he discovered a fifth satellite of Jupiter; he discovered sixteen comets, and did much for the advancement of celestial photography. He received medals from numerous scientific bodies, and was given honorary membership in others. One of his finest achievements is his nearly completed atlas of the Milky Way.

Barnard, Frederick A. P. (1809-1889), an American educator. He was a native of Sheffield, Massachusetts, and a

graduate of Yale College. From 1854 until 1861 he was connected with the University of Mississippi, but resigned at the breaking out of the Civil War. He was president of Columbia College, now University, New York, 1864-88. Barnard College for women, an affiliated school of the university, was established in accordance with his plans and was named in his honor.

Barnard, George Grey (1863-), a distinguished American sculptor, was born at Bellefont, Pa. He studied at the Art Institute in Chicago, and later in Paris. He exhibited at the Paris Salon in 1894, and received gold medals at the Paris Exposition of 1900, and at the Pan-American Exposition of 1901. His work is largely symbolic, and reveals a true originality of conception. Some of his better known works are *Two Natures, Friendship, Maidenhood, The God Pan,* and *The Hewers,* illustrating Scandinavian mythology.

Barnard, Henry (1811-1900), a distinguished American educator. He was born at Hartford, Connecticut. In 1855 he founded the American *Journal of Education.* He was president of the University of Wisconsin 1856-9. He was the first United States Commissioner of Education, holding that position from 1867 until 1870. He wrote several works of pedagogy, including *Hints and Methods for Teachers, German Educational Reformers,* and a volume on Pestalozzi. His reports are a mine of information on educational subjects.

Barnburners, in American politics, a progressive section of the Democratic party in New York. They were in reality bolters, who were displeased by the election of President Polk in 1844. They were represented as willing to destroy their party in an effort to reform it. The nickname was given them in allusion to an anecdote then current of a Dutchman who set fire to his barn to clear it of rats. The Barnburners favored canal construction and opposed the extension of slavery into new territory. Locally they supported the knot of political managers known as the "Albany Regency," as opposed to the National Democracy controlled by the friends of James K. Polk. Among the leaders admired by the Barnburners were William L. Marcy, Silas Wright, Martin Van Buren, and John A. Dix. Later this wing of the Democracy was merged with the Free-Soilers. See FREE SOIL PARTY.

Barnum, Phineas Taylor (1810-1891), an American showman. He was born in Bethel, and died at Bridgeport, Connecticut. His father was a tavern keeper. Phineas was fond of fun and of making money. From his *Autobiography,* we learn that he got his start in the world by keeping a country store. In connection with it he took advantage of a mania then prevalent, and opened up a lottery, with branches in neighboring villages. Later he paid $1,000 for a colored woman named Joice Heth, who claimed to be the nurse of George Washington. He exhibited her for a number of years, realizing as high as $1,500 a week. There is every evidence, as Barnum gleefully admitted, that she was thirty years younger than the child she claimed to have nursed. One of the principles laid down by Barnum in the account of his life is that the American people like to be humbugged, provided it be done in an agreeable way.

Among other enterprises, Mr. Barnum discovered Charles Stratton, a remarkable dwarf of Bridgeport, Connecticut, known as General Tom Thumb. Barnum exhibited Stratton and his diminutive wife both in this country and abroad. Queen Victoria, it is said, was particularly delighted with the little couple. Barnum brought Jenny Lind to this country for her first series of concerts, the gross receipts of which amounted to $700,000. He exhibited the "Happy Family" of birds and animals. In 1871 he established "The Greatest Show on Earth," the first great American combination of a traveling circus and menagerie. Jumbo, a mammoth elephant, 11 feet 6 inches high, traveled with this show until killed by a railroad accident in Canada. After making all the money he cared for, Mr. Barnum settled down at Bridgeport, Connecticut, where he built himself a comfortable villa and divided his time between farming and writing books, among others, *The Humbugs*

of the World, a work which he was eminently qualified to prepare.

See CIRCUS.

Barometer, a well known instrument for measuring the weight or downward pressure of the atmosphere. It was invented by Torricelli, an Italian physicist, in 1643. It consists of a hollow glass tube about thirty-four inches long, closed at one end, and filled with mercury. When full of mercury, the tube is inverted and the open end placed in an open cistern or small cup of mercury. The pressure of the atmosphere on the surface of the mercury in the cup prevents the mercury in the tube from running down and out. The greater the atmospheric pressure, the higher the mercury stands in the tube. A change in the height of the mercury, or barometric column, as it is termed, denotes a corresponding change in the weight of the atmosphere. By a grading or marking on the tube, these changes may be observed readily. The standard height of the barometric column is 76 centimeters or 29.922 inches, which is its average height at sea level in a latitude of 45°, with the temperature at 0° C. Barometers are used not only to detect changes of weather, but also to measure heights. The column falls at a very nearly uniform rate of one inch for every 900 feet of ascent. If the mercurial column is two inches shorter than the above standard, it is fair to argue that the observer is 1,800 feet above the sea. A more convenient instrument, but less trustworthy than the mercurial barometer, is the aneroid barometer, consisting essentially of a cylindrical box with a flexible top. The air is partially exhausted from within. The top, or diaphram, rises and falls with change of atmospheric pressure. These movements are indicated by a needle and a dial. See AIR; BALLOON; ALTITUDE; THERMOMETER; WEATHER BUREAU.

Barr, Robert (1850-1912), a British author, was born in Glasgow, Scotland. For a time he was headmaster of the Central School Windsor, Canada; and in 1876 he became a member of the staff of the Detroit *Free Press,* writing under the name of Luke Sharp. He removed to London in 1881, and in 1892 he, with Jerome K. Jerome, founded *The Idler,* a magazine which he edited until 1895. He is the author of *A Woman Intervenes, The Face and the Mask, In a Steamer Chair, Countess Tekla,* and numerous other works.

Barras, Paul Francois Jean Nicholas (1755-1829), a French statesman and revolutionary leader, was born in Provence of a noble family. As a youth he served against the British in India. Though of noble birth Barras eagerly joined the Revolutionary party in 1789. He took a very active part in the storming of the Bastille and the Tuilleries. He voted for the death without delay of Louis XVI. Barras was elected to the presidency of the Convention in 1795, and while in office he aided in the overthrow of Robespierre and other leaders of the Reign of Terror. He made Napoleon the leader of the Army of Italy, and ruled with a high hand as long as the Directory was in charge of French affairs. But when the Directory was replaced by the Consulate, Napoleon seized the reins, forcing Barras out of power and out of Paris. He subsequently resided at Brussels, Marseilles, Rome and Montpellier, always under strict police surveillance. He returned to Paris only after the Restoration. His memoirs are invaluable as a source of Revolutionary information.

Barrel. See COOPER.

Barrett, Lawrence (1838-1891), a noted American actor. He was a native of Paterson, New Jersey. In his professional career, Barrett was associated with Charlotte Cushman, Edwin Booth, and other eminent actors. He was an admirer of Edwin Forrest. He acted in Philadelphia, Washington, New York, New Orleans, and the leading cities of the West. He was manager of an opera house in San Francisco. Among the characters personated with great ability were Othello, Richelieu, Hamlet, Shylock, Cassius, and King Lear. Through a number of tours he became known to a wide circle of playgoers.

Barrie, James Matthew (1860-), a Scottish novelist, critic, and humorist. He was born at Kirriemuir, Forfarshire. He was graduated from Edinburgh University

in 1882, and engaged in journalism almost immediately. *A Window in Thrums,* published in 1889, was his first widely read book, although *Better Dead, When a Man's Single,* and *Auld Licht Idylls* had all preceded it. Other writings are *My Lady Nicotine, a Study in Smoke, The Little Minister,* usually regarded as his best work, *Sentimental Tommy, Margaret Ogilvie, The Little White Bird,* and others. Most of his serious critical work has appeared in London newspapers and periodicals. *The Little Minister* has been successfully dramatized. Mr. Barrie was offered knighthood by King Edward, but declined the honor.

For pathos fresh and unstrained; sympathy wide and human; pity tender and true, are the qualities which have made Barrie's *Window in Thrums* and *The Little Minister* shake the hearts of the human family. . . . Never a drop of gall mingles in the genial cup of his mirth; his humor penetrates to the heart of things, but never to wound.—Elliot Henderson.

Barrow, a heap of earth or stone raised over a place of burial. The earth tumulus of Greece, the stone cairn of Scotland, the Indian mound of America, and, indeed, the pyramids of Egypt, all belong to the same class of sepulchral monuments. Barrows are particularly numerous in England, and are classified according to their shape into round, long, conical, etc., barrows. When opened, the English barrows reveal the remains of the dead, frequently in rude stone chests, accompanied by arms and implements of the chase. The spearheads, arrow points, and other implements belong to three distinct ages. The earliest are of flint and bone, the next of bronze, and the more recent of iron. The term barrow is to be associated with burg, berg, or burgh, a height or hill. It has no connection with bury, and none with barrow in wheelbarrow.

Barry Cornwall. See PROCTER.

Barrymore, Ethel, (1879-), made her debut in a company headed by her uncle, John Drew, in 1896, and attracted general attention in 1900 for her work in *Captain Jinks.* After successes in *Secret Service* and *Cynthia,* she starred in *A Doll's House,* and in Barrie's *Alice-Sit-by-the Fire,* and her greatest success, *Mid-Channel.* In private life she is Mrs. Russell Griswold Colt.

Barrymore, John, (1882-), brother of Ethel Barrymore, made his debut in *Magda,* in 1903. He acted important roles in *Miss Civilization, A Stubborn Cinderella, The Fortune Hunter,* and *Hamlet.* He played as leading man for the Famous Players Film Company.

Barrymore, Lionel, brother of Ethel and John Barrymore, made his first professional appearance in 1893 in *The Rivals.* He has played also in *Arizona, The Other Girl, Fires of Hate, Pantaloon,* and enjoyed probably his greatest triumph as the star in *The Claw* and the *Copperhead.* He has also acted in motion pictures.

Barrymore, Maurice (Herbert Blythe) (1847-1905), American actor, born in India, and died at Amityville, Long Island, and was educated at Cambridge. He was a born actor, and possessed unusual talent. Barrymore made his first appearance on the American stage in 1875, and until his death played chiefly in the United States, appearing as leading man with Olga Nethersole, Modjeska, Bernard Beere and Mrs. Langtry. He wrote several plays, the one best known being *Nadjeska.*

Barter, the exchange of one kind of property for another without the use of money. The exchange of eggs for groceries is barter. Swapping jacknives or trading horses would hardly be called barter. Among primitive peoples, barter is the only form of exchange known. One who has a fish may give it to another in exchange for fruit. In his travels Dr. Livingstone speaks of a village tree on the branches of which the natives hung any article for which they had no immediate use. Each was at liberty to take away any article that he considered of equivalent value. John Smith bartered beads to the American Indians for corn. At the present time, barter is the only way of dealing with the natives of many parts of Africa who have no use for money. The great fur companies of the northwest built up their business by a system of barter. Guns, ammunition, knives, ribbons, beads, looking

glasses, axes, and many other articles were transported at great expense to the trading posts where they were bartered for furs. A gun had its price, not in money, but in so many beaver skins. Country stores still do a great deal of bartering. Traders among the American Indians exchange goods for various roots, fruits, furs, oil, rice, and other articles brought in by the Indians for that purpose.

A recent consular report speaks as follows of barter of native products for manufactured goods in Liberia, Africa:

Currency is absent from this section The natives bring their products—coffee, palm oil, palm kernels, palm wine, kasada, starch, piassava, ivory, skins, venison, camwood, rubber, beeswax, honey, gold, precious stones, sheep, goats, cattle, ginger, kola nuts, and other things—and for these they get from the merchant cloth, salt, tobacco, pipes, gin, cutlasses, brass kettles, iron pots, trinkets, beads, handkerchiefs, powder, caps, shot, stockfish, looking glasses, combs, Florida water, and other commodities, all of which are bartered at large profit. For instance, cloth purchased in England at 3 to 5 cents a yard is sold in trade for 24 cents.

Bartholdi, bär-tōl-dē′, **Frederick Auguste** (1834-1904), a French sculptor. He was born in Alsace, April 2, 1834, and died in Paris, October 4, 1904. Well known as the designer of the colossal statue of *Liberty Enlightening the World* in New York Harbor. Other statues by the same artist are the *Lion of Belfort; Lafayette* in Union Square, New York; and a bronze group of *Lafayette and Washington* in Paris. See LIBERTY, STATUE OF.

Bartholomew Fair, a famous fair held in Smithfield, London, 1133-1840. The fair opened on St. Bartholomew's day, August 24, Old Style, and September 3, after the change in the calendar. It was held for fourteen days at first, but at the last the period was shortened to four days. It was the great cloth fair of the kingdom. The weavers from Flanders and at home brought their wares to Smithfield for sale. Acres of booths were filled with all sorts of goods, from which purchasers could make a choice. The fair was removed to Islington in 1840, and fifteen years later it came to an end. During the last century of its existence it became nothing but venders' booths, and shows of all descriptions. Fairs were common throughout Europe. See LEIPSIC; NIJNI-NOVGOROD; FAIR.

Bartlett, Paul Wayland (1865-), an American sculptor, was born at New Haven, Connecticut. When he was only 14 years old he exhibited a bust of his grandmother at the Paris Salon. For his group, *The Bear Tamer,* he received honorable mention at the Salon in 1887. Mr. Bartlett's best known works are *The Ghost Dancer;* his equestrian statue of Lafayette, presented to France by the school children of the United States and now in Paris; and his statues of Columbus and of Michelangelo, now in the Congressional Library at Washington. In 1908, Mr. Bartlett was made a member of the Legion of Honor.

Bartolommeo, Fra (1472-1517), the assumed name of Baccio della Porta, an Italian painter. He was born at Florence and studied there under Cosimo Roselli, and acquired a better knowledge of painting by studying the works of Leonardo da Vinci. An admirer of Savonarola, he took the Dominican habit after the great reformer's death, and for some years did no painting whatever; and afterward painted nothing but religious subjects. He was a master of coloring, and excels particularly in his handling of draperies. His masterpiece is his *Saint Mark;* other important canvases are *The Madonna with Six Saints, Betrothal of St. Catherine,* and *Salvator Mundi.*

Barton, Clara, the founder of the Red Cross Society in the United States. She was born in Oxford, Massachusetts, in 1821. She was educated at home and at Clinton, New York. She opened the first public school at Bordentown, New Jersey, beginning with six pupils and closing with six hundred. Miss Barton obtained a clerkship in the United States patent office, and is said to have been the first woman clerk to draw a salary from a government department at Washington. During the Civil War she was active in hospital service. Near the close of the war she was employed by President Lincoln in tracing missing soldiers. After the war was over she gave war lectures. The Franco-Prus-

sian War drew her abroad, where she became identified with the International Red Cross Society of Geneva. On her return she organized the American Red Cross Society, which later passed under control of the general government. Miss Barton took an active part in various women's movements, being an earnest advocate of temperance, equal suffrage, and better social conditions for young women. She wrote *History of the Red Cross in Peace and War.* Her death occurred April 12, 1912.

Bartram, John (1699-1777), a Quaker farmer. A native of Pennsylvania. Bartram became interested in botany after he was twenty-four years old. He corresponded with the eminent botanists of Europe, to whom he was able to send many new plants to be named. Just imagine the interest with which he sent a new lady's slipper, *Cypripedium acaule Ait.,* to the Kew Garden. Linnaeus pronounced Bartram the greatest natural botanist in the world. He turned his grounds on the Schuylkill River into a botanic garden. Bartram's garden, the first in America, with a stone house built with his own hands, is happily preserved in the park system of Philadelphia. Many of the trees have reached a gigantic size.

Basalt, a dark, compact, finely grained, igneous rock. It is formed from lava by rapid cooling. It contains usually but little sand, potash, or soda; but is rich in lime, magnesia, and iron. When poured out into sheets, it is apt in cooling to take on what is known as a columnar or basaltic structure. The fluid mass cools into vertical, six-sided columns frequently of great regularity. The process is not essentially different from that which takes place when a mud flat dries and cracks in the sun, except that in the latter case regularity is lacking. The columns of the Giants' Causeway and of Fingal's Cave are familiar examples of a basaltic structure. The cliffs of the Columbia are noted for basaltic columns, as are the Palisades of the Hudson. In California, basalt forms the bottom rock under the gravel in rivers where the largest gold nuggets are found. The table lands of New Mexico and Arizona owe their shape to columns of basalt. See LAVA; VOLCANO.

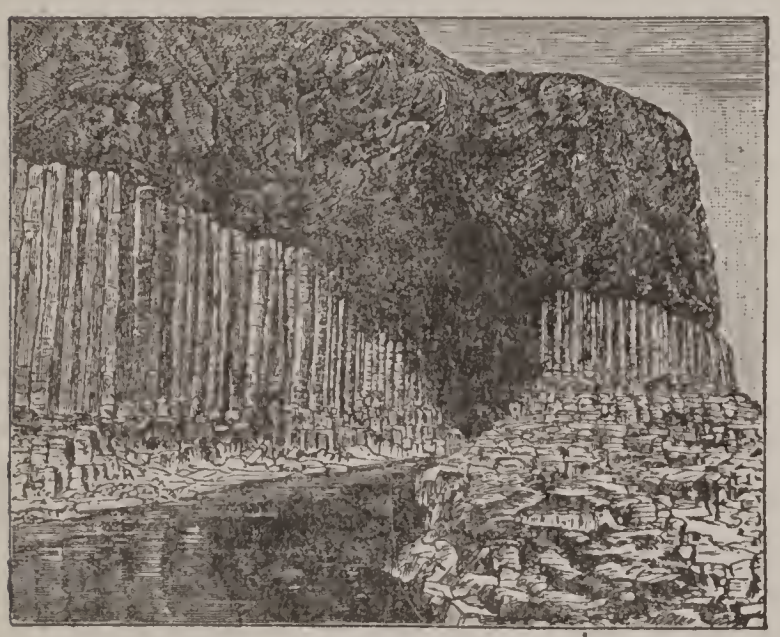
Base, in chemistry, a compound formed by a metal and oxygen; also, sometimes, hydrogen. Certain other elements combined with oxygen and hydrogen, or with hydrogen alone, form acids. An acid and a base unite to form water and a salt. Thus sodium combines with oxygen and hydrogen to form a base known as sodium hydroxide; chlorine unites with hydrogen to form an acid known as hydrochloric acid. Both the base and the acid named are liquids. They may be combined to form common water and the white powder known as common salt. Acids are sour; bases are bitter, slimy to the touch, and corrosive; salts are soapy or salty to the taste. The chief base-forming metals are: aluminum, calcium, gold, iron, magnesium, mercury, platinum, potassium, silver, sodium, tin, and zinc. A base changes red litmus to blue. See LITMUS; ACID; SALT; ALKALI.

Baseball, the American game of ball. It may have been developed from the English game of "rounders" to which, however, it bears little similarity. The game first took shape in New England and in the vicinity of New York and Philadelphia. The Knickerbocker Club of New York, considered the parent ball club of the United States, was formed in 1845. Crowds of New Yorkers used to cross by the huge ferries to Hoboken to attend games between the Knickerbockers and rival organizations.

During the Civil War baseball was a favorite form of amusement in camp. On the breaking up of the army, returning soldiers carried the game to every town and hamlet, and baseball seemed to spring up spontaneously everywhere. From 1865 onward it has been recognized as a national game. Rivalry between amateur clubs led to the employment of salaried players. Then came the organization of clubs into circles, in which each club goes around the circuit playing a series of games with its associate clubs. The National League, formed in 1876, now includes Brooklyn, Pittsburg, Philadelphia, Boston, St. Louis, Chicago, Cincinnati, and New York. The

Granite cliff in Bohemia.

Columns of porphyry, Tyrol.



Basaltic columns, Fingal's cave.

Trap rock, Rhone Valley.

Cannon-ball formation in Bavaria.

Obsidian cliff, Yellowstone Park.

Basaltic columns and balls, Prussian Rhine.

BASALT AND OTHER ERUPTIVE ROCKS.

American League, a rival organization dating from a reorganization in 1900, includes Boston, Philadelphia, Cleveland, Detroit, New York, Chicago, St. Louis, and Washington. The American Association is made up of St. Paul, Louisville, Milwaukee, Indianapolis, Kansas City, Columbus, Minneapolis, and Toledo. The Western League embraces St. Joseph, Tulsa, Wichita, Omaha, Sioux City, Oklahoma City, Denver, Des Moines. There are many other leagues as the Eastern, Central, Northern, Pacific, Southern. Indeed it is safe to say there are more ball clubs today than there are postoffices. The expenses of the large clubs are met by gate receipts. The Federal League made up of the cities of Brooklyn, Chicago, Pittsburgh, St. Louis, Baltimore, Kansas City, Buffalo and Indianapolis, was a considerable figure in baseball in 1914 and 1915, but was disbanded after two seasons.

The various leagues are brought into conformity by the National Association of Leagues, under whose rules all games of prominence are now played.

There is no better outdoor game for boys, and none better calculated to give strength, health, and activity, and none which furnishes more enjoyment to spectators.

Indoor baseball is a form of baseball arranged originally for gymnasiums, but played frequently in the open air. The ball is larger than is used in the ordinary game, measuring usually about seventeen inches in circumference. The bat is smaller than the common bat and differs slightly in shape. The rules of the game are formulated by the National Indoor Baseball Association.

Basedow, Johann Bernhard (1723-1790), a German author and educator. He was born at Hamburg. He died at Magdeburg. Basedow was educated in the gymnasium of his native town. He studied theology at Leipsic, but took up the work of tutoring young men. In 1767 he published a work, the name of which may be given to show the length to which Germans of that day carried titles,—*An Address to the Friends of Humanity, and to Persons in Power, on Schools, on Education, and its Influence on Public Happiness, with the Plan of an Elementary Treatise on Human Knowledge.* It was Basedow's ambition to establish a model school in which young teachers could be trained to carry his ideas abroad throughout Germany, the education of which he proposed to reform. In 1774 he published *Elementary Work,* an exposition of his ideas for the education of young children. The central thought was that children should be made to understand by seeing, hearing, feeling, and touching; or, to state the idea otherwise, to study things, and not mere words. A subscription enabled him to set up his model institute at Dessau. Basedow, however, had more temper than tact. He quarreled with his fellow teachers and left them to close up the institution. His institute at Dessau, however, is regarded as having prepared the way for the German system of normal schools.

Basel, bä′zel, an important manufacturing city of Switzerland, and the capital of Basel-Stadt. Basel is situated in the canton of Basel, in northern Switzerland, and its inhabitants use the German language. The French name is Bâle, and Basle is an old spelling of the same word. Basel is a well built city, lying on both sides of the Rhine River, which is crossed here by three bridges, the Alte Brücke, dating from the thirteenth century. Grossbasel, or Great Basel, lies on the south bank, Kleinbasel, or Little Basel, on the north bank of the river. A Roman military post in the fourth century, six hundred years later a free city of the empire, almost destroyed by the earthquake of 1356, nearly depopulated by a plague in 1444, a member of the Swiss Confederacy in 1501, and then coming to be one of the chief seats of the great movement known as the Reformation—Basel's history has been long and eventful. Perils from without, especially during the Thirty Years' War, and rebellion from within on the part of peasants discontented with the government, kept Basel for many years in a disturbed state, but it continued to grow and flourish, and the dangers from without having ceased, internal peace was established finally in 1833 by the separation of the

canton into two parts, Basel-Stadt and Basel-Land, which gave political rights to the rural districts. The old walls of Basel have been replaced by promenades, but some of the handsome medieval gates remain, and the fine old Gothic cathedral begun in the eleventh century still stands. There is a great university founded in 1459 and the city possesses a large public library, a valuable picture gallery, and a museum. Among its manufactures are silks, ribbons, gloves, linen, leather, jewelry, and paper. The famous "Baseler Leckerli" or Basel honeycakes are made here. In size Basel is second only to Zurich among the cities of Switzerland. Its population in 1920 was 135,976. See SWITZERLAND; ZURICH.

Basil'ica, in architecture, a Roman hall of justice. The name is derived from a hall in which the Greek basileus-archon heard cases involving religious disputes. The basilica became common throughout the Roman world shortly before the reign of Augustus. It was a huge oblong hall about three times as long as wide. The entrance was in one end. The opposite end was called the apse. It was semicircular in form. A raised floor or stage in the apse served as the tribune on which the judges sat on long semicircular benches. In order to support the roof, two rows of pillars ran from the apse to the front, dividing the main floor into a long, central nave, flanked on each side by a narrower aisle. Sometimes the architect set up a double row of columns on each side, making a double aisle. The nave was open clear to the roof. The nave of the early basilica was even without a roof. The aisles were surmounted by galleries for the accommodation of the public. Upon the introduction of Christianity, many basilicas were used as churches. The earlier Christian churches were built in the form of basilicas. The tribune was replaced by an altar. The addition of transverse arms converted the oblong of the basilica into the cross of the cathedral. Many old European edifices are halfway between basilicas and cathedrals. The Roman basilica is known chiefly by a study of ruins. Some of the more famous Christian basilicas may yet be seen at Rome, Treves, Ravenna, and elsewhere. See CATHEDRAL; ARCHITECTURE.

Basilisk, băz'ĭ-lĭsk, the fabled, eight-legged, lizard-like king of dragons and serpents. It is now considered that the basilisk and the cockatrice were the same superstitious conception under different names. The cockatrice was produced from an egg laid by a very old cock and hatched by a toad. "It inhabited the deserts of Africa, and, indeed, could only inhabit a desert, for its breath burned up all vegetation; the flesh fell from the bones of any animal with which it came in contact, and its very look was fatal to life; but brave men could venture into cautious contest with it by the use of a mirror, which reflected back its deadly glance upon itself." The name has been applied by zoölogists to a harmless hooded lizard of South America.

> Like as the Basiliske, of serpents seede,
> From powerful eyes close venim doth convay
> Into the lookers hart, and killeth farre away.
> —Spenser, *Faerie Queene.*

Basket, a receptacle of open work woven of rushes, willow twigs, rattan, splints, or other flexible material. Basket weaving seems to have been known to the most primitive people. The rudest tribes practice the art. Remains of baskets have been found in the ancient lake dwellings of Switzerland. The earliest pottery was made by spreading clay on a basket as a frame. The basket burned out in baking, but left marks by which the process can be identified. The boat or coracle of the ancient Briton was made by covering a large basket with a hide. Moses was set adrift among the bulrushes in a basket rendered water-tight with slimy clay. Fruit baskets of precious metals and costly filigree work were well known among the ancients. The roadsides in many parts of western Europe are devoted to the raising of osiers for basket making. It is difficult to draw the line between bags, baskets, boxes, and crates. Many baskets are made by combining wire and splints. Basket-making has become a large industry. The business of making baskets for the marketing of fruit has

grown into millions of dollars a year. See POTTERY; WILLOW.

Basket Ball, an American outdoor or gymnasium game. It was invented in 1891 by James Naismith, a member of the Springfield, Massachusetts, Young Men's Christian Association. It is played with a spherical, inflated ball, about ten inches in diameter. At either end of the hall or plot of ground, a hammock net is suspended from a ring about eighteen inches in diameter at a height of ten feet from the ground. The players, who may be of either sex, are divided into two parties or teams. A regular team should consist of at least five members,—a center, two forwards, and two guards. It is considered desirable that each team should wear a color by which its members can be distinguished readily. The game consists in throwing the ball into these nets or goals. Each party has its goal into which its members try to throw the ball. The game is started by an umpire, who throws the ball into the air. It may be struck with the hand, caught, or thrown by any player, but must not be carried, nor must the player touch the ball while it is in the hands of another. When the ball falls, it belongs to the player who first picks it up. It is not allowable to shove or detain a player. A player's progress may be barred by standing in the way. A throw may be obstructed by holding up of arms in front of the ball, or by springing up with outstretched arms. The game is an excellent one.

Basques, bȧsks, a peculiar people inhabiting the border provinces of France and Spain on the Bay of Biscay. The Basques are supposed to be a remnant of a primitive people once occupying France and Spain. Like the Welsh of Britain, they have persisted in the mountain fastnesses of the Pyrenees. The Basque language, which is spoken by about 60,000 people, is unlike any other known. "'Tis said the Basques understand one another; for my part I will never believe it," said Scaliger. The Basques have preserved their own dress and customs. They are a simple, brave, independent people, cultivating small farms at home, but fond of seafaring. They are said to have been the first Europeans to catch the whale. Biscay is another spelling for basque. The bay of that name is therefore the Bay of the Basques. The short-skirted jacket or basque is an article of national dress worn by the Basque women.

Bass, a name used in a confused manner for unrelated fishes. The sea-bass is a perch, others are related to the sunfish. The striped bass, three to five feet long, is a fine, gamy sea-bass entering rivers from Nova Scotia to Florida to spawn. Its relative, the white bass, with an arched, greenish back and silvery sides, with several dusky streaks, is found in the waters of the upper Mississippi Valley to the Great Lakes. There is also a black, mottled sea-bass on the Atlantic coast. Unrelated to these, and found in the waters of eastern North America from Canada to the Gulf, are the black basses. Of the smaller-mouthed species, a writer quoted by Jordan says: "The black bass is eminently an American fish; he has the faculty of asserting himself and of making himself completely at home wherever placed. He is plucky, game, brave, unyielding to the last, when hooked. He has the arrowy rush and vigor of a trout, the untiring strength and bold leap of a salmon, while he has a system of fighting tactics peculiarly his own. I consider him, inch for inch, and pound for pound, the gamest fish that swims." Ex-President Cleveland maintained that this bass is superior to the trout as a game fish. The large-mouthed black bass, or Oswego bass, known also as the green bass and bayou bass, is larger and is more sluggish than his fellow. The rock bass, a handsome fellow, closely related to the sunfish, is a favorite with young anglers. See FISH.

Bassanio, bȧs-sä′nĭ-o, in Shakespeare's comedy, *Merchant of Venice,* a Venetian gentleman, friend of Antonio. Nerissa speaks of him as "a scholar and a soldier." These words describe the ideal man ot the time. Bassanio is Portia's successful suitor, although his part in the play in unimportant. See MERCHANT OF VENICE.

Basswood, or **Linden,** a well known softwood tree of the north temperate

zone. The European linden is a favorite shade tree. Unter den Linden, the finest avenue in Berlin, took its name from the linden trees which were planted its entire length. The family name of Linnaeus, the eminent botanist, is derived from the linden. Linden is a more poetical name than basswood, and really more fitting to so fragrant and handsome a tree; but basswood, a word derived from the strong cord-like bast that forms the inner part of the bark, is the American name and will persist. Basswood grows quickly, and is a beautiful wood for carving and turning. It has long been a favorite in Europe for wooden ware. The wood cuts admirably into thin sheets for fruit boxes, for which its freedom from taste and odor render it desirable. The flowers are yellowish, and furnish pasturage for bees. "Basswood honey" is one of the finest honeys on the market. The fruit of the tree is a small nut-like body, borne in clusters attached to the midrib of a large bract. See BERLIN.

Bastien-Lepage, Jules (1848-1884), a French landscape painter. His original treatment of outdoor scenes, his realistic handling of light, and the unconventional poses of some of his subjects, marked him as the leader of a new school of painting. His *Portrait of My Grandfather* shows the subject in the unconventional act of taking snuff. Other noted portraits are those of Sarah Bernhardt, the Prince of Wales, and Andre Theuriet. He won several medals, and in 1879 was made a chevalier of the Legion of Honor.

Bastille, a gate tower, an outlying defense, or citadel. The word appears to have meant originally to build. The term is used commonly in describing the castles of the Middle Ages. In French history, the name acquired the meaning of state prison. Many French cities had bastilles. The bastille of history is the Bastille of Paris. It formed a part of the medieval walls of Paris. It formed and defended the gate of St. Antoine. It was a massive building and was preserved when the rest of the walls and fortifications were razed. It was used as a state prison by the French monarchs. The Bastille was begun in 1370. It consisted at first of two round towers 75 feet high, one on each side of the city gate. Afterward a tower was added on each side of these two, and massive walls, ten feet in thickness, strengthened by four more towers, were built within the city, so as to include a quadrangle or inner court 162 feet long and 72 feet wide. Louis XI ordered cages of iron constructed for the confinement of prisoners. There were vaults beneath the tower on a level with the waters in the moat. They were dark, musty, and infested with rats. They were dreaded by prisoners. When completed, the Bastille was a strong, stone castle, with massive walls, surmounted by eight gloomy towers. It could be entered only by a drawbridge crossing a deep moat. The entrance was defended at its inner extremity by stone gates.

During the centuries preceding the Revolution, the French monarch exercised the arbitrary authority of ordering obnoxious persons imprisoned in the Bastille, where they remained sometimes the rest of their lives without trial or communication with the outside world. Any person who had the ill will of an intriguer at court, or who became dangerous by reason of his political influence, was likely to be whisked off and immured in the Bastille beyond all hope of rescue by friends or course of law. In this way the Bastille became a symbol of despotic authority. It was hated particularly by the friends of liberty and fair dealing everywhere. The Bastille stood in the artisan quarter of St. Antoine, the birthplace of the French Revolution. One of the first cries, when the mad populace broke loose, was, "Down with the Bastille." An infuriated mob, strengthened by several companies of soldiers who sided with the people, attacked the castle and forced an entrance. The common soldiers of the guard were spared, but the officials of the prison were taken from the military and were butchered. Seven persons were found in the dungeons. One had been there thirty years without sight of the outside world. Early in the century, a prisoner had written on the walls of his cell, "The Bastille shall one day be

demolished, and the people shall dance on the area where it stood," and indeed they did. The Bastille was torn down to the last stone. The material was used in building a bridge across the Seine. The former site is devoted to a public square called the Place de la Bastille, in the center of which rises a marble monument 154 feet in height. The sides of the pedestal bear bronze medallions symbolical of justice, the constitution, strength, and freedom.

The Bastille fell July 14, 1789. Soon after its destruction, Lafayette sent a model of the Bastille and a key to General Washington accompanied by the following: "Give me leave, my dear General, to present you with a picture of the Bastille just as it looked a few days after I ordered its demolition, with the main key of the fortress of despotism. It is a gift which I owe as a son to my adopted father; as aid-de-camp to my general; as a son of liberty to its patriarch." The model, which is two or three feet in length and about half as wide, and the wrought iron key, about seven inches in length, are kept safely at Mt. Vernon. See LAFAYETTE; PARIS.

Basutoland, an important British grain growing and stock raising possession of South Africa. It has an area of 11,716 square miles, and consists of an elevated but rugged plateau. It lies to the northeast of Cape of Good Hope Province, and is bounded by that province and by Natal and the Orange Free State. Basutoland is especially well watered and enjoys an equable climate. As a result, it is considered the best grain growing district in South Africa, and produces excellent pasturage for the Basutos' large herds of cattle.

Basutoland has been under direct control of the British Crown since 1884. A native named Griffith who bears the title of Paramount Chief is the nominal ruler, but the British maintain here a Resident Commissioner. For purposes of administration the country is divided into seven districts.

The population of Basutoland in 1921 was 497,696 natives, 1,615 Europeans, and 155 Indians. European settlement in the country is restricted to the few necessary traders, missionaries and government officials. The capital is Maseru, and it is also the largest town, having a population of 2,319 natives and about 400 Europeans. The country is policed by about 300 natives under 25 white officers.

Basutoland produces wheat, kaffir, corn, wool and coal. There were recently 22,800 plows in the country, 86,600 horses, and 433,000 cattle. There were 400 native elementary schools in 1920, with 32,500 pupils enrolled. Normal and industrial schools also add to the educational advantages offered the natives.

The country has no navigable rivers and has only 16 miles of railroad, but there are good roads for wagon transport. Imports, amounting roughly to $5,000,000 in 1920, consisted chiefly of blankets, iron and tin ware, clothing, plows and foodstuffs; exports, amounting in the same year to $4,500,000, consisted of live stock, wool and grain.

Bat, a flying animal difficult to classify. Its nature is indicated pretty well by the old English name of "flittermouse." The flying squirrel merely sails. The bat is the only mammal capable of genuine flight. The five toes of the hind foot, and the thumb of the front foot, or hand, are furnished with curved claws, by which it customarily hangs, head downward, from supports when it rests. The scientific family name signifies wing-handed. The entire arm and the four greatly elongated fingers are connected by a thick membrane, which extends along the flank to the hind leg. A similar membrane runs from the heel to the tail in some species. These membranes, or wings, enable the bat to fly with a swiftness and skill equal to that of the swallow. The membrane, which is more or less furry, is furnished with delicate nerves which apparently enable the swift animal to tell almost instinctively, probably by the increasing density of the air, when it is approaching an object that ought to be avoided. At all events, the bat can wheel and dart with perfect safety, and in utter darkness, amidst rocks, trees, rafters, and obstructions against which it might

be expected to dash itself. The bones of the hand being especially long, the fingers are frequently longer than the body. They cannot be doubled into the palm, like the fingers of a person's hand. They simply close together and fold up the membranes like the ribs of a lady's fan. Large folds of skin about the mouth, and ears of extraordinary size, are extremely sensitive, and it is thought that the bat, whose flight is absolutely noiseless, can hear slight noises of which a person would be wholly unaware. Bats vary greatly in size. The common bat is no longer than a mouse. Certain Asiatic species have a wing stretch of five feet.

There are about 450 species of bats, divided into two main groups. The fruit eaters are confined chiefly to the tropics of the Old World. The insect eaters are distributed throughout both continents. The bats of cold countries are usually dormant in winter. A large New England bat migrates southward in the fall. The little brown bat, abundant everywhere east of the Rocky Mountains, has a small, fox-like face with a high forehead, and pointed snout, large ears, and naked wings. It has small, weak teeth and is harmless. It hangs upside down in the daytime in hollow trees, caves, and outbuildings, flitting at night about barnyards to catch mosquitoes, gnats, and other insect pests. The bat takes no pains to make a nest. One or two young are produced at a time. When hunting food, the little ones often go with the mother, clinging to her neck, or else she hangs them by their hooks on the branch of a tree while she seeks their supper. It seems unnatural for a bat to walk, and yet it can make some progress by hitching along, one side at a time, using its hind feet and the ends of its wings as best may be.

The common bat has small, noticeable eyes, as black as a jet bead. The popular saying, "as blind as a bat," is founded on accurate observation. The eyes of bats have been found to be imperfect in that the portion of the retina which is most concerned with perception of light is not well developed. As if to compensate for this, we find, in some species, the outer ear, in others the skin around the nostrils or on the lips and chin, developed into large outgrowths in which are many delicate nerves. One bat that lives in Europe has such long ears that they must be folded under the bat's arm while it sleeps. In another European bat, the skin grows out on the nose like a leaf in shape. By means of these outgrowths, a bat entirely blind, if let loose in a room in which numerous strings have been stretched, will fly about without touching one.

The flying foxes or fox-bats of India and Madagascar are the largest bats known. Allied to them is an African species which frequents the interior of the pyramids and dark ruins in Egypt.

Batavia, the capital and seaport of the Dutch East Indies. It is situated on the north coast of Java, in the latitude of 6° 8′ S. The harbor is deep, picturesque, and safe. Ships anchor within the shelter of numerous islets. The business portion of the city is low, being built on a marsh by the sea. The quarters for the Dutch soldiers, offices for officials, and the dwellings of the wealthier merchants are in an elevated suburb which is very modern, possessing water works, electric street railways, electric lights and telephones. Batavia has long been the seat of Dutch commerce in the east. It was founded by them in 1619. The products of the Dutch East Indies are collected at Batavia for shipment, chiefly to Amsterdam and Rotterdam. The warehouses are piled high with rice, sugar, tea, indigo, quinine, tobacco, spices, Java coffee, and other East Indian products. The merchants import cotton goods and implements for distribution to plantations far and near. The Batavian trade is one of the chief sources of Dutch commercial prosperity. Steamer landings average fifteen a day. The population of Batavia in 1918 was 234,697, including about 9,000 Europeans, 28,000 Chinese, and 2,000 Arabs.

Bath, a city of England. It is picturesquely situated in Somersetshire on the Avon, about due west from London and not over twenty miles from Bristol. There are famous saline and chalybeate hot springs. During the Roman occupancy of

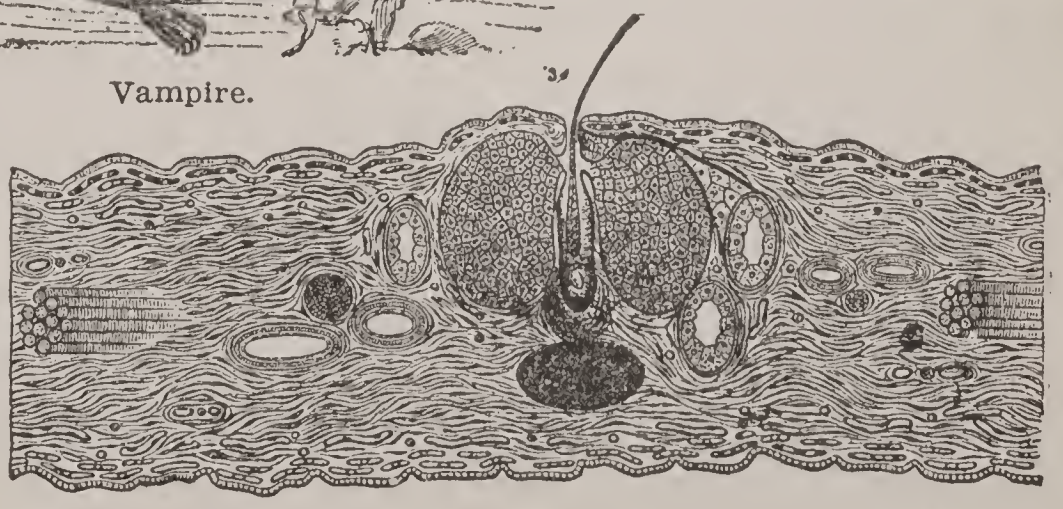
Lid-nosed, long-tailed bat of Egypt.

Head.

Bat with horse-shoe nose, Europe and Asia.

Vampire.

Head of vampire.



Vertical cross-section of wing membrane of European vesper bat, magnified 600 times.

BATS.

the island, the springs were known from their high temperature as *Aquae Solis,* waters of the sun. The Romans erected magnificent baths here. Five halls yet remain. The largest is 68 by 110 feet. They were heated by a system of flues beneath the floor. One of the tanks is lined with lead. The Roman watering place was destroyed by the Saxons. The Bath was rebuilt during the seventeenth and eighteenth centuries. Under the leadership of Beau Nash it became the most fashionable watering place in England. Bath is now a modern city of 69,519 people. There is a fine abbey church in the "perpendicular" style of architecture. Large windows of rich tracery are set so close together that the edifice is called the "Lantern of England." Bath does not maintain its former reputation for fashion, but it is still the resort of invalids. The principal springs, four in number, supply over 7,000 gallons of water an hour. The temperature of the water is from 108° to 117° F.

Bath, a name applied to the washing of the body or to facilities for doing so. Among primitive peoples, no arrangement is made for bathing, not even for washing the face, except as the native may plunge into natural bodies of water. The South Sea Islanders are said to be fond of bathing in the surf. Their children take to the water like young seals. As civilization advances, especially in warm countries, the bath has been recognized as a necessary part of household arrangements.

Public baths were constructed by the Greeks and Romans on a magnificent scale. Maecenas, Agrippa, Agricola, Diocletian, and Titus provided Rome with bath houses, the remains of which still arouse admiration. Water for the Roman bath house was brought from the Apennines through aqueducts. In some of these baths 2,000 to 3,000 persons could bathe at one time. Wherever the Roman arms extended, in Africa, in the East, throughout western Europe, and even in England, extensive baths were built. The famous watering places of Europe were first made known by bath houses built during the period of Roman occupancy.

On the principle that "cleanliness is next to godliness," modern cities are beginning to pay attention to public baths. Liverpool, London, Pittsburg, Newark, Boston, and other cities deserve mention.

The cold, the tepid, and the warm bath are so named from the temperature of the water used. The cold bath should be used in the morning, as otherwise the bather is apt to catch cold. The most celebrated bath is the Turkish bath, although the Turks were not the first, by any means, to use it. A genuine Turkish bath requires the use of at least three rooms. The first should have a temperature ranging from 115° to 120°, the second from 120° to 140°, with a third ranging from 150° to 175°, or even as high as 200°. The bather stays from five to fifteen minutes in the hottest room, then for an equal length of time in the next, and cools off in the third room while an attendant rubs his skin and works his muscles. The loss of weight from perspiration is quite noticeable.

The Russian bath is a vapor bath. This may be taken by wrapping the body in a heavy blanket and sitting in a chair over boiling hot water, the temperature of which may be maintained by the immersion of red hot bricks.

Bathometer, an instrument for measuring depths, especially of sea water. One kind is a peculiar, self-registering spring balance. It is difficult to ascertain the depth of the ocean. This instrument is based on the density of sea water at varying depths. The deeper the water, the greater its density and the greater its buoyancy. A stone weighs less—comes nearer floating—in deep water than in shallow water. The operator takes the weight of a sinker just beneath the surface of the sea, and again after the apparatus has been lowered by a cord into the sea. As stated, the index of the balance registers the weight. A comparison of the two results is made. The difference in buoyancy gives the difference in density and enables the scientist to compute the depth.

Baton Rouge, băt′ŭn rōōzh, the capital of Louisiana. It is situated on the eastern bank of the Mississippi and is eighty mile

northwest of New Orleans. Baton Rouge was one of the early French settlements in Louisiana, and has still many quaint old French and Spanish houses. These with its situation on a bluff above the river give it a picturesque appearance.

Five railroads run through the city. The manufactures include brick, lumber, cotton goods, sugar, rice and petroleum products. The State University and Agricultural Experiment Station are located here. Population, 1920, 21,782.

Battenberg, bät'ten-berg, a small Prussian town which has given its name to a grand ducal family of Hesse. Alexander, Prince of Hesse, married the Countess von Hauke. The marriage was morganatic, that is, it was stipulated that neither the wife nor children should inherit the title or possessions of the husband. In 1857, however, the title of Countess of Battenberg was conferred upon Prince Alexander's wife, and her sons, therefore, became Princes of Battenberg. Prince Henry of Battenberg married Princess Beatrice, daughter of Queen Victoria, and their daughter is Princess Victoria Eugenie, or, as she is called frequently, Princess Ena, wife of Alfonso XIII of Spain.

Battering Ram, a device for hammering down the walls of cities. Before the invention of gunpowder, the chief defense of a city consisted in a high wall, with entrances defended by massive gates. The battering ram employed by the ancients for hammering down these walls was of two sorts. The chief feature of the first was a huge beam swung by cables in a frame. The end of the beam was shod frequently with an iron head, and the frame in which it swung was provided with a roof to protect the operators from a shower of stones and javelins from the top of the wall above. A number of men applying their strength to the beam caused it to swing to and fro in such a way that one end struck the wall with tremendous force. The other sort was operated on rollers. The force of the battering ram depended, of course, on the weight of the beam and the force with which it was propelled. Rams, employed by the Romans at the siege of Carthage, were so large that a hundred men were required for their operation. A Roman writer describes one that must have weighed over twenty tons. Those in charge are said to have made a study of striking the wall at the right moment, so that the force of the blow might be added to the natural vibrations of the wall, just as a boy learns to push a swing. The frame of a ram was moved to and fro on rollers.

Battery, a combination of voltaic or galvanic cells. The cell is a device for changing chemical energy into electrical, which in its simplest form consists of two metals immersed in an electrolyte. Strips of copper and zinc will serve the purpose. One metal is acted upon more strongly by the acid than the other, which gives rise to an electrical pressure, so that when the metals are joined by a conductor, a current will flow between them. To increase the effect the cells are often joined, either with unlike poles connected, when they are said to be joined in series; or with all like poles connected, spoken of as in parallel. The former is used when the external resistance is high and the latter when low. A combination of the two methods is often employed when a maximum current is desired.

Quite distinct from this, known as the primary cell, is the secondary or storage battery, also called an accumulator. In this, the difference in the electrical condition of the plates is produced by sending a current through from some outside source. The energy of this charging current is thus stored up in the form of energy of chemical combination. When this charging has continued a sufficient length of time, the cell may be removed and used as a primary cell. Its advantage over the primary cell lies in its greater rate of discharge due to a higher electrical pressure and a lower internal resistance. The actual quantity of electricity obtained is no more than was utilized in charging, is in fact, slightly less.

The storage battery as used today was originated by Gaston Plante, a Frenchman, in -1859. In improved forms it is of great value for a variety of purposes. On automobiles with an electric starter it is used

to store energy for cranking the engine, lighting the lamps, and supplying sparks for the ignition system. It supplies the current required for telephoning, propels mine locomotives and electric tractors, swings draw-bridges, and is the source of power in electric automobiles. Naval guns are fired by the current from storage batteries, and in the power and lighting stations of our cities there are storage batteries as big as a house for use in emergencies.

Battery, The, a park of twenty-one acres at the southernmost point of the island of Manhattan. It was formerly the site of a Dutch fort. Early prints show that it was surrounded by a large number of aristocratic Dutch residences, some of which may still be seen. Castle Garden, a little island a few feet off shore, at one time occupied by a fortification, and up to 1890 used as reception quarters for steerage immigrants, has been united with the Battery by a filling of earth, and now forms a part of a public park. The new quarters are now devoted to the purposes of a public aquarium and museum. The Battery is a sightly, attractive spot of interest even apart from its historical associations. See NEW YORK CITY; CENTRAL PARK.

Batting, raw cotton, or wool, carded into thick sheets or laps, used for bed-comforts, mattresses, and various domestic purposes. Cotton is put up usually in one pound rolls. Wool is often carded in sheets sufficiently large for a bed comfort, a layer of thin cheesecloth being tacked lightly to either side to hold the wool in place and prevent matting. Finely carded cotton batting is sterilized and put up in convenient packages for surgical uses. See CARDING.

Battle Above the Clouds, a battle of the Civil War. The reference is to the storming of Lookout Mountain March 24, 1863. It was part of the general battle of Chattanooga. The Federals, under "Fighting Joe" Hooker, advanced up the northern slope of the mountain. All day the mists hid the valley below; and in the afternoon the clouds settled down so thick that the rattle of artillery ceased an hour for very darkness. Hence the name of "Battle Above the Clouds."

Battle Creek, Mich., is situated on the Kalamazoo River at its confluence with Battle Creek. This city is the home of the famous Battle Creek Sanitarium, which was established in 1866, where dietetic experiments are conducted. The city is a trading center for the rich agricultural and fruit growing district surrounding it. Here are located extensive car and locomotive repair shops of the Grand Trunk Railroad. Besides breakfast foods, important manufactures are threshing machines and other agricultural implements, flour, boilers, engines and pumps, and paper boxes. Population, in 1920, 36,164.

Battle of the Books, a satirical work by Jonathan Swift, written in 1697, and printed seven years later. It was written when the controversy as to the relative merits of ancient and modern literature was at its height. The *Battle of the Books* represents a contest between the classic and modern books in the king's library. It is clever and witty, sneering at the shams of pedantry. It was written to uphold the views of Sir William Temple, and is full of spite. For this reason it loses much of its value as an authority. See SWIFT.

Battle of the Frogs and Mice, an ancient Greek mock-epic. It is known by its Greek name, *Batrachomyomachia,* bat-ra-kō-mī-ō-mā′ki-a. Its authorship is unknown. The plot is witty. A mouse, having escaped from a cat, is urged by a frog to visit his home. At the first sign of danger the frog plumps into a pool. The deserted mouse soliloquizes after the manner of an epic hero and dies. The mice hear of the affair and wage war on the frogs. The battle is a parody on Homer's *Iliad.* The gods are brought in, the deliberations of Zeus and Athena being very clever. The mice win the victory but are put to flight by an army of crabs, who appear to aid the frogs.

Battle of the Kegs, a mock heroic poem by Francis Hopkinson. During the winter of 1777-8 the British army under General Howe made Philadelphia winter headquarters. The Americans made a few torpedoes out of kegs and sent them down the Delaware in hopes of annoying the British shipping. One keg seems to have exploded in the hands of some curious

boys, maiming one of them. The British gunners occupied themselves in firing at other kegs that appeared with the tide a few days afterward, but the incident attracted no particular attention until Francis Hopkinson got hold of it and wrote a poem to the tune of *Maggy Lander,* in which he described the alarm created by the kegs, and heroism displayed by the British in the terrific attack made on the kegs. The song served to keep up the spirits of the colonists.

Battle of the Nations, the third battle of Leipsic, October 16-18, 1813. A combined force of 300,000 Austrians, Russians, Swedes, and Prussians defeated Napoleon's army of 180,000. The French loss was 40,000 killed and wounded, and 30,000 taken prisoner. The loss of the allied forces was about 54,000 killed and wounded.

Battle of the Three Emperors. See AUSTERLITZ.

Battleship, in modern warfare, a heavy, armor-plated warship. The history of the battleship may be traced step by step from the old two or three-decked wooden galley propelled by benches of oarsmen. The Greeks and the Romans protected the sides of their galleys with heavy hides. The Normans and Saracens used blankets of heavy, thick felt for the purpose. Protective plates of lead were used as early as the middle of the twelfth century. Richard the Lion Hearted captured a ship of this description from the Saracens in 1191. In 1585 the citizens of Antwerp constructed a large, flat bottomed ironclad, with a view to raising the siege of their city. They built the walls of their ship of thick timbers and plated it with iron. In high hopes, they christened it "The End of the War." When they sailed forth, however, to break through the lines of the enemy, it ran aground and fell an easy capture. In derision the name was changed to "Wasted Money." As early as 1600, the Japanese clad their fighting ships with plates of iron and copper. As early as the eighteenth century, the English hung curtains of rope over the sides of their fighting ships

Ironclads were used to some extent during the Crimean War. The use of the armor-plated ship in modern warfare, however, dates, with American writers, at least, from the famous conflict of the Monitor and the Merrimac in 1862. The modern warship contains almost no wood at all. Frame, floor, and walls are built of steel. To be considered a battleship of the first grade, a craft must carry heavy guns, be protected with thick armor, and have a reasonable degree of speed.

One of the largest battleships of recent years was the British super-dreadnaught, Audacious, wrecked off the north coast of Ireland, late in October, 1914, by a mine. This war engine was of 27,500 tons displacement; its main armament consisted of ten 13.5 inch guns; it carried three torpedo tubes. The horsepower of the engines was 31,000 and its speed 21 knots.

Two new United States dreadnaughts, the Colorado and the West Virginia, are nearing completion. Each has a displacement of 32,600 tons, a speed of 21 knots, and carries eight 16 inch and fourteen 5 inch guns and two 21 inch torpedo tubes. On November 1, 1922, the most important fighting ships that the United States had in commission were 17 dreadnaughts; 10 armored cruisers; 2 cruisers, first line; 4 cruisers, second line; 10 light cruisers, first line; 2 aircraft carriers; 2 mine layers; 102 destroyers, first line; and 94 submarines, first line. See ARMOR PLATE; NAVY; CONVENTION ON LIMITATION OF ARMAMENT.

Baucis and Philemon, ba'sĭs, fī-lē'-mŭn, in Greek legend, an aged couple of Phrygia. The story runs that Zeus and Hermes were once traveling in disguise through the country. In their weariness they sought rest and refreshment, but were turned from every door until they reached Philemon's cottage. He received the strangers hospitably, while Baucis prepared the very best meal her poverty permitted. When the repast was ended the visitors disclosed tneir identity. They punished the inhospitable people by sinking the entire country until only a lake was to be seen. Philemon's cottage, however, remained standing, but was changed

into a beautiful temple, of which he and his wife were appointed keepers. Then the gods offered to grant any request the old people might make. After consulting together, Baucis and Philemon requested only that they might die, as they had lived, together. The request was granted. They lived to be very old and then were changed at the same moment into two trees standing before the door of the temple.

The Roman Ovid has written a poem entitled *Baucis and Philemon* of which Dryden has made a translation. Goethe also wrote a poem having the same title. Swift has treated the subject in burlesque style, representing the cottage as changed into a church, of which Philemon becomes parson.

> The groaning chair began to crawl,
> Like a huge snail, along the wall:
> There stuck aloft in public view,
> And, with small change, a pulpit grew,
> A bedstead of the antique mode,
> Compact of timber many a load,
> Such as our ancestors did use,
> Was metamorphosed into pews,
> Which still their ancient nature keep
> By lodging folks disposed to sleep.

The names of Baucis and Philemon are of frequent occurrence, in literature and conversation, to designate loving and faithful married people.

Bauxite. See ALUMINUM.

Bavaria, ba-vā′rī-a, once a kingdom of the German Empire, now a part of the Republic of Germany. In addition to Bavaria proper, the kingdom included a distant, detached province, county we would call it, situated on the west bank of the Rhine opposite Baden. The area of Bavaria is 30,562 square miles, about equal to that of Maine. The population, however, about 7,140,340, is about nine times as great, or 233.8 to the square mile. The births exceed the deaths, however, to a very great extent. Seven-tenths of the people are Catholics. The rest belong to various denominations. Education is compulsory up to fourteen years of age. A few square miles in the northeastern part lie in the basin of the Baltic; the Rhine and its tributary, the Main, drain other portions; but by far the greater part of Bavaria is drained through the Danube into the Black Sea. The general surface of the country is broken. The hills and mountains are composed chiefly of disintegrating limestone. The valleys and slopes are accordingly of great fertility. One half of the country is under the plow; one-third is covered with forests of pine and fir, and the remaining sixth is devoted to meadows and pasturage. The chief crops are wheat, rye, barley, oats, potatoes, millet, hemp, flax, madder, and hops. Grapes are raised on Lake Constance and in the valley of the Main. Cheese and other dairy products are an important source of revenue. A large amount of timber is cut annually. A very great number of small manufacturing establishments are spread all over the country, devoted chiefly, however, to supplying local markets. One of the chief industries is that of brewing. There are a great many breweries, which, according to recent statistics, produced the enormous quantity of 163,235,116 gallons of beer in 1919.

The constitution under which it is governed was adopted late in 1919. This constitution abolishes all privileges arising out of birth or caste, and vests the people with supreme power. Suffrage is universal. The Church is separated from the State, and all religious associations have equal rights.

Education is free, and compulsory from the ages of six to sixteen. Bavaria has three universities, one each at Munich, Wurzburg and Erlangen. Technical and special schools are numerous; and Bavaria has a world reputation for the fineness of its art schools.

STATISTICS. The following are the latest reliable statistics available:

Land area, square miles	30,562
Water area, square miles	257
Forest area, square miles	10,150
Population (1919)	7,140,340
Munich	630,711
Nuremberg	352,675
Augsburg	154,555
Ludwigshafen	90,721
Wurzburg	86,571
Number of divisions	9
Members of Diet	158
State revenue	$479,269,000
Bonded indebtedness	$547,241,000
Farm area, acres	5,000,000
Wheat, bushels	25,267,000
Rye, bushels	33,700,000
Oats, bushels	38,000,000
Potatoes, bushels	115,000,000

Domestic Animals—	
Horses	365,026
Cattle	3,667,244
Sheep	741,483
Swine	1,740,703
Goats	431,691
Output of wine, gallons	18,252,662
Output of beer, gallons	163,235,116
Output of alcohol, gallons	2,609,598
Coal mined, tons	2,890,000
Iron ore mined, tons	415,000
Output of pig iron, tons	175,900
Output of cast-iron ware, tons	156,900
Output of sulphuric acid, tons	33,400
Miles of railway	5,300
Teachers in public schools	22,104
Pupils enrolled	1,091.345

Bayard, bā′ard, **Chevalier de** (1475-1524), a French soldier. He came of good family, and was noted for his handsome bearing, pleasant manners, and skill in the tilt yard. He wore, of course, the complete armor of the day, and won great renown in various feats at arms. At one time he guarded a bridge against 200 Spaniards until the French army could secure a more advantageous position. During the war between Francis I and Charles V, he held a town with 1,000 men against an army of 35,000 for six weeks, and saved France from invasion. He was at one time taken prisoner by the Italians and again by the English; but was set free without ransom, so great was his reputation for valor and humanity. Chivalry and knighthood are surrounded by no little glamor. Bayard is considered an ideal knight, the type of what all knights should have been. He was slain in an expedition sent against Italy. His body was brought home and interred at Grenoble. He is spoken of in the annals of his country as *"Le chevalier sans peur et sans reproche,"* a knight without fear and above reproach.

Bayard, Thomas F. (1828-1898), an American statesman. He was born at Wilmington, Delaware, in which city he practiced law until elected to the United States Senate. He was a member of the electoral commission of 1876, secretary of state in President Cleveland's first cabinet, and ambassador to the Court of St. James in Cleveland's second term. He belonged to an old Huguenot family, whose ancestor was driven from Paris to Holland to escape persecution. A son of this refugee married a sister of Peter Stuyvesant, the famous Dutch governor of New York, and became a wealthy merchant in Amsterdam. Upon his death, however, the widow followed her brother Peter to the New World, and took up an estate on Manhattan Island, where the Astor Library now stands. Four descendants of the family have been members of the United States Senate, and others have held positions of no less distinction and responsibilty. The family is noted for ability and uprightness of character.

Bay City, a city of the lower Michigan peninsula, situated on the Saginaw River three miles from Saginaw Bay. It is the county seat of Bay County and is notable for its fine public buildings and beautiful streets. It is a railroad center, important as a distributing point for a large district. Among industries are foundries, chemical works, bicycle works, and shipyards. It has also coal mines and lumber interests, and manufactures beet sugar, boxes, and wooden ware. Its population in 1920 was 47,554.

Bayeux (bä-yu′) **Tapestry,** a famous piece of needlework or embroidered tapestry made by Matilda, wife of William the Conqueror, or under her immediate direction. It is 20 inches wide and 230 feet long. It contains 1,512 figures with Latin inscriptions, giving their names and the subjects of composition. It is supposed to be a panoramic representation of the invasion and subjugation of England by the Normans. The events are those leading up to and immediately connected with the battle of Hastings, 1066. It is therefore exceedingly interesting, not only as a specimen representative of the needlework of the Middle Ages, but also for certain details of history not given by the chroniclers of that period. Matilda is said to have given this tapestry to the library of the Cathedral of Bayeux, where it was discovered in 1728. During the Napoleonic wars, Napoleon carried it away to Paris, but later it was brought back to Bayeux and is now exhibited in the city hall. See HASTINGS; NORMANDY; TAPESTRY.

Baylor University. An institution owned and controlled by trustees elected by the Baptist General Convention of Texas. It was founded at Independence under a charter issued by the Republic of Texas in 1845. In 1886 Baylor and Waco Universities were united, taking the name of Baylor, but located at Waco. It has a school of Fine Arts in Waco.

In 1903 it organized its colleges of Medicine and Pharmacy at Dallas, Texas. These are graded "A," as is the Baylor Hospital, a teaching institution with a closed staff. In 1918 it organized a College of Dentistry at Dallas. It is "A" grade. In 1920 it organized a Law Department. It will graduate its first class this year. In all departments the faculties number about 180. The enrollment for the past year was 2,391.

Bayonet, a steel dagger or stabbing instrument, made to be attached by an infantryman to the muzzle of his gun. In its original form, it had a sharp point and three edges. It was also made with a flat or sword-shaped blade. The shank was inserted in the muzzle of the gun after the soldier had fired. An improvement has been introduced by forming a shank in the shape of a ring in which the muzzle of the musket may be inserted in such a way that the soldier may fire his gun with the bayonet fixed. The name is derived from Bayonne, a Biscayan town of France, where it is said to have been invented, and this theory is very probable.

Bayonne, N. J., an important manufacturing city, situated on Newark and New York bays, and on the Lehigh Valley and the Central of New Jersey railroads, about six miles southwest of New York. It is the most important distributing point for petroleum on the Atlantic Coast and the largest refinery works of the Standard Oil Company are here. These are connected by pipelines with the oil fields of Pennsylvania and Ohio and with the leading cities along the Atlantic Coast as far as New Orleans. The largest works of the American Radiator Company are also here, as well as many lesser manufactories. Bayonne is an attractive residential city and many homes of New York business

in northern Bavaria, midway between Munich and Leipsic. Bayreuth is noted as a seat of culture, and is the place chosen by Richard Wagner for Wagnerian festivals devoted to the rendering of his music. The town is pleasantly situated. It has fine buildings and a large local trade. Population, 33,128. See WAGNER.

Bay State. See MASSACHUSETTS.

Bazaine, François Achilles (1811-1885), a courageous but unfortunate marshal of France, was born at Versailles. Entering the French army at the age of twenty, he served in Algeria, Spain, the Crimea, and the Italian campaign of 1859, winning distinction in almost every battle. Bazaine was sent to Mexico at the head of a French army, in pursuance of an allied plan of intervention—to which France was a party—in the struggles between Miramon and Juarez. When the war with Germany opened, Bazaine was put in command of the Third Army Corps, near Metz, and after the battles of Wörth and Spichern he took command of the main French armies. After a series of defeats, he retired into the fortress of Metz, which, on October 27, 1870, he surrendered. As a result of this unsoldierly capitulation, Bazaine was tried by court martial in 1873, and sentenced to death. This sentence was commuted to imprisonment for twenty years on Isle Sainte-Marguérite. He escaped from the island in 1874 and went to Madrid, Spain, where he died.

Beach, Rex Ellingwood (1877 —), an American magazine writer and novelist, born at Atwood, Michigan. He was educated at Rollen's College, Winter Park, Fla., and at Chicago College of Law and Kent College of Law, Chicago. The immediate success of several short stories, however, caused him to devote his time to writing instead of the practice of law. The appearance of *Pardners* (1905) and of *The Spoilers* (1906) gained for him a wide popularity as a writer of fiction and assured his literary career. Among his more recent books are: *The Barrier, Going Some, The Ne'er-Do-Well, The Net,* and *The Iron Trail.* Several of his stories have been dramatized and a number

of them have furnished material for the moving picture screen.

Beacon Fire, a signal fire. Before the days of telegraphy, beacon fires kindled on hills were used to convey important intelligence, such as the approach of an invading army. A bright fire by night or a dense smoke by day could be seen for a long distance. A line of beacons carried news from mountain top to mountain top with great speed. An old act of the Scottish Parliament, 1455, relating to the border beacons, directed that "One bale on fire should be warning of the approach of the English in any manner; two bales blazing beside each other that they are coming indeed; and four bales that they are coming in great force." Similar fire signals were employed, we are told, in ancient Persia, Palestine, and Greece. The Swiss kept watchers on guard to light beacons in case of invading Austrians. Within recent years the Indians of the Rocky Mountain regions used signal fires to convey intelligence of the movements of the United States troops, arranging beforehand a great variety of signals to be given. The lantern hung for Paul Revere in the tower of North Church was a signal of this sort. The lantern carried by the railroad brakesman may be regarded as a sort of beacon light. It is used to give signals.

Beaconsfield. See DISRAELI.

Beads, small perforated globules or cylinders used for ornamental purposes. They may be made of different material, as amber, coral, garnet, steel, pearl, rock crystal, and various seeds, but chiefly of glass. Glass beads have been found in the cases of Egyptian mummies, in the ruins of Nineveh, and in the burial places of the ancient Greeks, Romans, and Britons. The Phoenicians are believed to have understood the manufacture of glass beads, 3000 B. C. During the Middle Ages, Venice became noted for the manufacture of beads. It is still the most important center of the industry. Millions of pounds are made each year. The glass is first stained with any desired luster, or variegated by threads of different colored glass, and is then drawn out into tubes of the desired diameter. The beads are then pinched off. If smooth ends are desired, the beads are heated almost to the fusing point. Some of the expensive sorts are cut and polished like diamonds.

As an article of barter, beads have played no small part, not only in the caravan trade of the ancients, but later in dealing with the savage tribes of India, Africa, and America. One writer enumerates no less than 400 kinds used in trading with the African negroes. The Indians of North America were skillful in weaving beads into the ornaments of their hunting shirts and moccasins. The wampum of the American Indian was in fact but a band of shell beads.

Civilized nations, as well as savages, are pleased with beads. They are worn as necklaces and are woven into laces and jet ornaments. In the service of the Roman Catholic church, a string of beads has long been employed as a convenient method of counting off prayers. "The Rosary of the Blessed Virgin Mary," for instance, consists in the recital of fifteen decades of *Aves;* each ten is preceded by a *Pater Noster* and followed by a *Gloria.* The prayers are divided into three chaplets of five decades each; one for the joys, one for the sorrows, and a third for the glories of Christ. A string of beads consisting of one for each prayer in the chaplet is called a rosary. The penitent keeps track of his prayers by telling his beads, that is, slipping one through his fingers for each repetition. In fact, the name bead is derived from the old English word *bede,* akin to bid and bade, meaning a prayer. To tell one's beads is to say one's prayers. A beadsman is one who says prayers.

See BARTER; WAMPUM.

> The hooded clouds, like friars,
> Tell their beads in drops of rain.
> —Longfellow, *Midnight Mass.*

> I envy them, those monks of old;
> Their books they read and their beads they told.—G. P. R. James, *The Monks of Old.*

> Numb were the Beadsman's fingers, while he told
> His rosary, and while his frosted breath,
> Like pious incense from a censer old,
> Seem'd taking flight for heaven.
> —Keats, *The Eve of St. Agnes.*

Bean, a name applied to various plants of the pea family. Bailey recognizes five types.

1. The broadbean of history, an erect plant with large flattened seeds. This sort is much grown in Europe for fodder and ensilage. The summers of the United States are too short and hot for it, though the broadbean is grown to some extent in eastern Canada for cattle. It is closely related to our handsome wild peas of the copse wood (*vicia*). Originally it is said to come from the Caspian region.

2. The kidney bean. This is the type usually meant by the American bean. The navy bean belongs to this variety. It includes our common American field, garden, soup, and string beans. Whether bush or climbing, this is the bean of commerce, and the "Boston baked bean."

3. The Lima bean. A tall pole bean with large flat seeds, really a member of the second group.

4. Slender beans. South American beans of a long, slender type in which we are little interested.

5. Soy beans. A Japanese or Chinese bean lately attracting attention in the United States as a forage plant.

Beans are raised easily. As shiftless a man as Thoreau raised them at Walden Pond. To say that land is "too poor to raise beans," is to place a low estimate on its fertility. Harvesting, however, is another matter. Beans must be pulled and allowed to dry before they can be threshed. Many growers pile them up about stakes and protect from rain by a canvas cover. In continued dry weather they may be cured on the ground, but this method is risky. The bean crop of the United States is about 10,000,000 bushels. Michigan, New York, California, Maine, and Florida raise from 100,000 to 1,000,000 bushels each. In addition, about 19,000 acres are planted in green beans yielding a million and a half bushels of string beans for the market. It is stated that a dollar will buy more food in the shape of beans than in any other form. Sheep are fond of beans.

See PEA; CLOVER; WEEVIL.

Bear, a family of well known animals. The bear has a shaggy coat, a heavy, clumsy body, and a short tail. It walks on the entire sole of the foot, rather than on the toes. The nearest American relative is the raccoon. There are many species, distributed throughout Europe, Asia, and America; but, excepting in the Atlas Mountains, none are known in Africa or Australia. The bear of history is the common brown bear of Europe, which, however, is becoming very scarce. It had disappeared in England by the time of the Norman Conquest. It is the heraldic emblem of the Swiss canton of Berne. Kipling likens Russia to "the bear that walks like a man."

Four groups are recognized in America: The black bear, the white bear, the grizzly bear, and the brown bear; in all, as some think, seventeen or more species. The cinnamon bear is classed with the black bear. The black bear is distributed everywhere in North American forests, unless exterminated. It is rather a solitary animal, each family occupying its own range, to the exclusion of others. It enjoys a great variety of food,—fish, insects, acorns, beech nuts, and, in time of scarcity, it is not averse to carrying away a farmer's pigs or sheep. It is fond of berries, especially of blueberries and bearberries. The bear is also very fond of honey. It digs up the nests of bumblebees, and will tear open a rotten log or tree in which a swarm of bees may have hived. Its thick hair protects it from the sting of the bees. This bear is entirely inoffensive and attacks a person only under the most extreme provocation, or in defense of its young. From one to three cubs are produced at a birth, and remain blind for about four weeks. In the autumn, the bear rolls itself up in a hollow tree or cavern, or in an excavation under some stump or log, and sleeps through the winter. It is a very imitative, good natured animal. If not tormented, a tame bear will roll about the dooryard playing with the dog and children. Specimens kept on the parade ground of a military post have been known to go through the manual of arms without instructions, shouldering a stick for the purpose.

In addition to the ordinary black bear, the group includes the Labrador bear, the

Louisiana bear, the everglade bear, the cinnamon bear of the Rockies, the Queen Charlotte bear of British Columbia, and the glacier bear of Alaska, the latter being the smallest American bear known.

The polar bear of the far north is creamy white. This bear brings forth its hardy young in such a den as can be made in an Arctic region, frequently under the snow. It swims with great facility, pursuing seals and fishes in the water; the eider duck, and other Arctic birds on land. A young walrus is quite to the polar bear's taste. In summer, it varies a flesh diet with roots and mosses. This bear follows the edge of the ice pack. No water is too icy, no weather too cold, for this bear. With its warm, shaggy coat, it quite enjoys its Arctic home. Its tracks have been seen as far north as 84°. Owing to the nature of the region in which it lives, the polar bear is likely to live after all other species are extinct. As many as a score have been seen at one time on a single islet. A well grown specimen weighs eight hundred or a thousand pounds.

The prevalent western species of the Rocky Mountains is the powerful grizzly bear, a strong, but, if let alone, not a dangerous animal. It seldom attacks man. However, it is considered an undesirable neighbor in the vicinity of a stock ranch. Bret Harte has described the grizzly admirably in the following lines:

> Coward,—of heroic size,
> In whose lazy muscles lies
> Strength we fear and yet despise;
> Savage, whose relentless tusks
> Are content with acorn husks;
> Robber, whose exploits ne'er soared
> O'er the bee's or squirrel's hoard;
> Whiskered chin and feeble nose,
> Claws of steel on baby's toes.

Joaquin Miller, who has written a whole book of bear stories, states that he never knew a grizzly to begin a fight or to eat human flesh. They are clumsy, good-natured eaters of berries, capable of becoming enraged, but they are never cruel. They never toy as a cat does with a mouse. Grizzly bears at one time were found as far east as Minnesota but the genuine grizzly of California is now rare. There are some fine specimens in the Yellowstone National Park. Allied species are the Sonora grizzly found in New Mexico, the Alaskan grizzly, and the Barren-Ground grizzly which is still hunted in the Great Slave Lake region.

The group of American brown bears was distributed until of late among the blacks and grizzlies. It contains several Alaskan species. The Kadiak bear, found chiefly on the island of that name, is the largest of all bears, the largest flesh eating animal known. It eats berries, grass, and salmon. Skulls nineteen inches in length are in museums. A specimen killed lately measured fifty-one inches in height at the shoulder. The outstretched forepaws were capable of spanning ten feet, six inches. The Kadiak bear weighs twice as much as a grizzly.

See BEARBERRY; BERNE.

Bear and Bull, the popular names of two classes of brokers or operators on the stock exchange, or board of trade. The names derive from the mode of attack of each of the animals named—the bear tries to tear down with his claws, while the bull tries to toss up with his horns. Hence the stock exchange bear endeavors to force prices down, while the bull tries to force them up.

Bear Baiting, the practice of setting mastiffs to fight with captive bears. The custom was once prevalent in England, and afforded great amusement, both to rustics and those of high degree; but it was a matter of life or death for the bear. The sport was forbidden by Parliament in 1853. One of Macaulay's most enjoyable quips at the expense of the Puritans is found in discussing bear-baiting. "The Puritans hated it, not because it gave pain to the bear, but because it gave pleasure to the spectators." The real reason for objection, of course, was that they knew the sport brutalized the spectators. The Puritans were the first modern legislators to insist on humane treatment of all dumb animals.

Bear, Great and Little. See CONSTELLATION.

Bearberry, a small, red-fruited plant of the blueberry kind. The ordinary bearberry grows in northern blueberry countries everywhere,—in Siberia, northern Europe, and North America. It is a favorite

berry with the common bear. Some thirty other species of bearberry are found, chiefly in North and Central America. One, the Nevada bearberry, grows in the haunts of the grizzly bear, illustrating the principle that certain plants and animals are found together. Change your berry and you change your bear.

Bearings, in machinery, the name given to the parts in contact with which a journal moves. In a shaft or axle, the bearing is the part in contact with its supports; and in general, a bearing is the part of any piece where it is supported, or the part of another piece on which it rests. In an automobile, for example, the bearings are the parts which support the axles and other members which revolve, and they are designed to do this with as little friction as possible. Bearings are used at the two ends of the connecting rods on a steam engine. For reciprocating motion the surfaces of the bearings must be made up of elements that are straight in line with the motion, and such bearings are usually called guides. For rotary motion the bearing surfaces must be "surfaces of revolution," as in the automobile, with other examples in the hangers of mill shafting, the pivots of turntables, the trucks of railway cars, etc. The portion of a revolving shaft which lies in the bearing is known as a journal, and between this and the bearing a film of lubricant is usually maintained to reduce friction. For the same purpose, the bearing surfaces are often made of special metal.

Bearings are mainly of three types—plain, ball, and roller bearings, and may be exclusively of one type or may combine any two of these types in one bearing. The shaft may be made to revolve in the bearing or the bearing may be made to revolve around the shaft. Plain bearings consist fundamentally of a "female" reproduction of the journal on the shaft, just sufficiently greater in size than the journal to permit of easy motion and the introduction of lubricant. Usually, however, it is arranged in designing plain bearings that different metals shall be opposed for the frictional surfaces, to lessen friction. With this end in view, castings for plain bearings generally have the bore "bushed" or lined with the metal that is most suitable for the conditions under which the bearing has to work. The bearings used in automobiles have to contend with varying loads and high speeds, so that in order to provide the necessary wearing qualities the bearings are often constructed of phosphor or manganese bronze, or some other anti-friction metal which works well when opposed to steel.

Ball bearings are those in which a row or rows of hardened steel balls, traveling in a proper track or ball race, are inserted between the revolving and stationary faces. On account of the slight frictional contact and the rolling action of the balls themselves, these bearings allow of very high speeds being attained with a minimum of friction and immunity from overheating. A common example of the use of ball bearings is found in bicycle and motorcycle hubs, and bearings of this type also give good results under heavy loads.

Roller bearings embody fundamentally the same principle as ball bearings, but theoretically a line contact is obtained instead of a point contact, as with a ball. The shaft rests within a cage in which rollers are closely spaced, and bears on the rollers, which are free to revolve either freely on their own axes or between the shaft and an outer casing of hard steel. The cage is for the purpose of keeping the rollers apart from each other and insuring that they shall always maintain a position parallel with the line of the shaft. With roller bearings the same advantages are gained of reduced friction as with ball bearings, but with the further gain that the bearing is not limited to a single point, but may be etxended to any required length. And as parallel roller bearings are incapable of adjustment, this difficulty has been met by the use of conical rollers, which may also be so designed as to take up the end thrust which has to be provided for in the case of motor vehicles. The amount of power that may be saved by the use of roller bearings renders them extremely valuable in automobile construction, and they give excellent results in wheel hubs, rear axles, and transmission. The conical roller bearing is popular for these purposes.

Bearings are also named from the functions they perform; for example, collar bearings, thrust bearings, and cone bearings. These terms, however, denote the combination of the male and female portions. A collar bearing consists of a journal bounded by two collars or parallel concentric rings attached to the body of the shaft and working so as to permit of rotary but not of lateral motion. Thrust bearings, as the name implies, are used for taking the thrust or end pressure off a shaft, and there are many forms. Both types of bearings are used in motor vehicles. The great thing for the motorist to remember about bearings is that they should be kept tight.

Beattie, James (1735-1803), a Scotch poet and philosophical writer. He was educated at Marenshall College, Aberdeen, where he later became professor of moral philosophy. He is best known by *The Minstrel,* a long poem representing the development of the poetical genius of a youth from childhood until he became a poet, a minstrel. His other works include *Essays on Nature and Immutability of Truth, Dissertations, Elements of Moral Science.*

Beatty, be′ a ti, **Sir David** (1871—), a British naval officer who was prominent in the Great War. He joined the navy at the age of 13. At the outbreak of the World War, he commanded the first battle-cruiser squadron and in August, 1914, he led a British fleet into the bight of Helgoland and attacked a part of the German fleet, sinking three armored cruisers and two destroyers. In 1915, Beatty was raised to the rank of vice-admiral and, in May, 1916, he proved his skill as a commander in the battle of Jutland. The following December he succeeded Sir John Jellico as commander-in-chief of the British fleet. In 1901 Sir David married Miss Ethel Field, eldest daughter of the late Marshall Field of Chicago.

Beau Brummel, brŭm′el, George Bryan Brummel (1778-1840), a famous leader of fashionable London society. He was a favorite of the Prince of Wales, afterward George IV. Inheriting a fortune, he lived in splendid style, gave magnificent dinners and enjoyed the most aristocratic society. For twenty-one years his word was law in all matters pertaining to court dress and etiquette. Then suddenly, the Prince's favor was withdrawn. Brummel's money, too, had been spent or lost at the gaming table, and the "Beau" retired to Calais to live his last years in poverty. His mind gave way under the strain and he died in a lunatic asylum.

Beaumarchais, Pierre Augustin Caron (1732-1799), the most important French dramatist of the eighteenth century. He was a musician as a young man, and became teacher of the harp to the daughters of Louis XV. His best works are the two comedies, *The Marriage of Figaro,* and the *Barber of Seville.* Both are replete with wit, satire and general liveliness, and made their author justly popular.

Beaumont, Francis (1586-1616), and **Fletcher, John** (1576-1625), two English dramatic writers. Little is known of the lives of these two men except that for ten years they were so closely associated as friends and literary partners that we rarely hear their names separately. Beaumont was educated at Oxford; Fletcher at Cambridge. They drifted to London. Their intimacy began in 1608 and continued until broken by Beaumont's death. Together they produced about fifty-two plays. The best known are *The Maid's Tragedy, The Knight of the Burning Pestle, Philaster,* and *The Faithful Shepherdess.* Of the two, Fletcher was undoubtedly the greater.

Beaumont, Tex., on the west bank of the Neches River, is the county seat of Jefferson Co. At the head of tidewater navigation, it is an important shipping point; but it is most notable as an oil center. The gusher wells drilled on the rock formation known as Spindle Top are among the most remarkable in the history of the oil industry. It is also in the center of an extensive rice growing region. The largest rice mill in the country is here. It has a fine school system, and the Bell Austin Institute is here. Population, 1920, 40,422.

Beauregard, bō′reh-gard′, **Pierre Gustave** (1818-1893), an American sol-

dier. He was a native of New Orleans and a graduate of West Point. He distinguished himself in the Mexican War, but resigned from the Union Army to enter the Confederate service. He is noted as the commander who gave orders for the reducing of Fort Sumter, which was accomplished April 12, 1861, and may be said to have precipitated the Civil War beyond all hope of recall. He led the victorious Confederates at the battle of Bull Run in the same year, and was with Johnston at Shiloh. After the close of the war, he engaged in various commercial enterprises. He accepted at one time the management of the nefarious Louisiana lottery, a course which occasioned his friends much regret. See SUMTER; CIVIL WAR.

Beauty and the Beast, an old fairy tale told in various forms and in many languages. The story is that of a beautiful young girl, who, to save the life of her unfortunate father, becomes the guest of a frightful monster. The Beast, however, proves both kind and intelligent. In spite of his ugliness, Beauty learns to love him. He is then able to resume his true form, which is that of a handsome young prince. The story has many English versions, Miss Thackeray's being the most worthy of mention. A counterpart to the tale is thought to exist in the old Greek legend of Eros and Psyche. See PSYCHE.

Beaver, an aquatic gnawing animal resembling the muskrat. It is the largest rodent now living. At one time the beaver was common throughout northern Europe and North America as far south as central Mexico. Beaver skins were a sort of currency among the American settlers, and formed a considerable article of export to the mother country. The demand for this fur was so great that large trading companies were formed, with posts extending throughout British America. The American range of the beaver is now restricted to a few scattering colonies in northern New England, the Lake Superior region, and from the Rio Grande Valley northward in Canada to the limit of trees. Under shelter of a law forbidding their being trapped, prior to 1910, beavers are said to have become numerous in certain parts of northern Michigan. A few colonies are still found under protection in Russia and Norway. The beaver became extinct in England about the time of Richard I.

The life of the beaver is a peculiar one. When a band of beavers takes possession of a stream, their first care is to secure a pond of water by constructing a dam. Saplings and brush are gnawed off near the ground, dragged into the water, and laid in the channel lengthwise, where they are weighted down with earth and stones. This process is continued until the entire channel has been filled. They then make their dam water-tight by covering the upper end with earth, grass, and clay. They convey material between their fore-paws, and pat it into place with their feet. The object of the dam is to form a pond so deep that it will not freeze to the bottom in the coldest weather. If at any time a leak is sprung, the beaver hastens to mend it. A burrow with its entrance under water is dug for some distance into the bank, turning upward under an old stump or other place of concealment, where the mother rears her young. The beaver lives chiefly on the bark of the birch, basswood, maple, and poplar. Beavers seldom show themselves in the daytime. The most of their work is done in the evening and morning twilight.

The beaver is about thirty inches in length, reddish brown above, and grayish below. It weighs from thirty to fifty pounds. Its pelt is still in great demand. When the long outer hairs are plucked out, the beaver's fur is of unsurpassed softness and durability, ranking perhaps next to that of the seal. The paws are small; in swimming they are folded under the body; they enable the beaver to handle and carry sticks, limbs of trees, mud and stones; he uses his paws as hands while sitting up or walking on his hind legs. The hind legs are the propelling power in swimming, and the feet are fully webbed to the roots of the claws. The beaver has a bare tail shaped like that of a muskrat. It is about nine inches long

and four wide. It serves as a rudder. Good authority states that the tail is used to slap the water by way of giving alarm, but that it is not used as a trowel in building dams. The beaver is able to cut down large trees even a foot or two in diameter, the branches of which it gnaws off and drags to the bottom of the pond beneath the reach of frost. It thus secures a food supply for the winter. Passages lead from the bottom of the pond to an upper chamber, where the beaver stays during winter. See MUSKRAT.

Bebel, Ferdinand August (1840-1913), a famous leader of the Social Democratic Party of Germany, was born at Cologne. He set up as a master turner in Leipzig and there came under the influence of Wilhelm Liebknecht and was converted to Socialism. Throwing himself into the work of the organization with a whole-souled devotion, Bebel rose to be chairman of the permanent committee of the German workingmen's unions in 1867. In 1872, he was accused of high treason and sentenced to prison for two years and nine months. During this and other but briefer terms of imprisonment Bebel made up for his lack of education and incidentally increased his prestige with the German workers. He succeeded Liebknecht as editor of *Vorwaerts,* organ of the Social Democratic Party. Bebel is the author of several books, including *The German Peasant War, Our Aims, Women and Socialism,* and an autobiography.

Bec, a famous Norman abbey. The name is derived from a beck or rivulet by which a pious knight fixed his hermitage. His fame for piety attracted followers until a religious community was formed according to the Rules of St. Benedict. Lanfranc, a Lombard scholar of noble ancestry, became a lay brother. Under his influence the monastery acquired a reputation for learning. Anselm came to study and remained to become abbot. Under these men, both of whom became archbishops of Canterbury, Bec, says Green in his *History of the English People,* became for a time the most famous school in Christendom. The school of Bec flourished during the eleventh century. Bec is now a mere ruin. See ANSELM.

Becket, bĕk'et, **Thomas à** (1117-1170), Archbishop of Canterbury. He was educated at Oxford, London, and Paris. In the service of King Henry II, he rose from poverty to be lord high chancellor and the king's favorite adviser in war as well as in peace. Henry had him appointed Archbishop of Canterbury, expecting in all controversies with the church to have Becket on his side. Becket was no sooner confirmed as archbishop, however, than he abandoned his frivolity and riotous living, and became the most decorous of prelates, zealous for the dignity of the church. He was soon engaged in a quarrel with the king, relative to certain privileges of the clergy, and the wicked doings of some of the nobility whom Becket proceeded to excommunicate. The trouble between Henry and his archbishop rose to such a pitch that the exasperated monarch is said to have exclaimed, "Have I not about me one man of spirit enough to rid me of a single insolent prelate?" Three of his followers took the hint and repaired to Canterbury, where they slew Becket at the foot of the altar. The pope took up the matter. King Henry was required to do penance at the saint's tomb. The populace regarded Becket as a hero, a friend of the common people, and a martyr. Pilgrimages to Canterbury to the shrine of so holy a person were quite the fashion and are described in Chaucer's *Canterbury Tales.* See CANTERBURY; CHAUCER.

Becky Sharp, or **Rebecca Sharp,** the principal female character in Thackeray's *Vanity Fair.* She is represented as a friendless girl, "with the dismal precocity of poverty," determined to rise in the world. She is described as "small and slight of person, pale, sandy-haired, and with green eyes, habitually cast down, but very large, odd, and attractive when they looked up." With wit, tact, and resolution to make her way, without scruple or conscience or moral principle, there is in all literature no other such striking picture of the managing woman as Becky

Sharp. She is everywhere the recognized type of the shrewd and skillful adventuress. See VANITY FAIR; THACKERAY.

Bed, a place to sleep. If a person works in one place, eats in another, and sleeps in a third, the place of his bed is his home or legal residence. We are so accustomed to think of a bed as consisting of a bedstead, springs, a mattress, sheets, pillows, and blankets or coverlets, that we hardly realize how the great majority of people sleep. There are still tribes of mankind that lie in lairs like wild beasts. The traveler with a dog team in Eskimo land, sleeps in a fur bag and hood. He is able to lie down in the shelter of a snowbank anywhere. The Persian sleeps on an oriental rug; the little brown Jap lies on a piece of matting with a wooden block—a short log of bamboo—for a pillow; the Russian peasant places his mattress on the top of a huge earthenware stove; the well-to-do German sleeps alone in a narrow feather bed with a light, downy, feather mattress to cover him. The Romans considered the introduction of feather beds a sign of luxury and an indication that the nation was going to ruin. They first taught the rude inhabitants of Britain to sew up the leaves and hair of their beds in ticks. In the time of Francis I the French bed of state was so high that it required a stepladder. The uncorrupted American Indian slept between fur robes; the Kentucky settler made a bunk or platform of poles in one corner of the cabin. In this he piled beech and oak leaves and covered them with furs, making a bed fit for royalty. The woodsman of the north gathers the ends of spruce boughs and arranges them, tips upward, to form a fragrant bed. Wrapped in his blanket, he sleeps a sleep unknown to the inhabitant of the city. The lumberman constructs board bunks half filled with hay, on which he spreads his blankets. In the Gulf States, the bedstead, usually with four high posts, is still protected by a rectangular canopy to exclude insects. Of late, bedsteads of enameled iron, vermin proof, have come into favor. Hair mattresses are preferred to feathers because they afford better ventilation. See FURNITURE.

Bedbug, a nocturnal insect infesting houses the world over. The bedbug is reddish brown, with a flat, ovate body about one-sixth of an inch long. It lives in cracks in furniture, floors, and woodwork. Determined housekeepers say that the bedbug can be exterminated in any home by a repeated feathering of all possible lurking places with corrosive sublimate dissolved in alcohol. The bedbug is wingless. The nest of the barn-swallow is infested by a related species. There is a popular impression, probably unfounded, that chimney swallows bring bedbugs.

Bede, bēd, a learned and industrious English monk of the monastery of Jarrow, in the county of Durham. He lived about 673-735. He says of himself: "I applied myself wholly to the study of the Scriptures and, amid the observance of regular discipline and the daily care of singing in the church, I always took delight in learning, teaching, and writing." As a teacher he made the monastery so famous a center of learning that 600 monks resorted thither to enjoy the library and be under the influence of Bede. He wrote treatises, in Latin, of course, on *The Nature of Things,* including astronomy, arithmetic, medicine, grammar, rhetoric, and music. His chief work, an *Ecclesiastical History of Our Island and Nation,* was translated into Anglo-Saxon by King Alfred, and, being the earliest writing of the kind, gives Bede the honor of being called "The Father of English History." In this work occurs the famous sentence, "There are no snakes in Ireland." He declined the position of abbot, not wishing to fritter away his time in housekeeping affairs and office holding. Bede was buried at Jarrow. His bones were stolen by a pious man and carried to Durham cathedral on account of their sanctity, and were later inclosed in a fitting shrine; but during the riots and the sacking of Catholic places of worship in the reign of Henry VIII, the shrine was broken up and the ashes of the "Venerable Bede" were scattered.

First among English scholars, first among English theologians, first among English historians, it is in the monk of Jarrow that English literature strikes its roots. In the six hundred scholars who gathered round him for instruction, he is the father of our national education. In his physical treatises he is the first figure to which our science looks back.—Green, *History of the English People.*

Bedford Cord, a fabric of either cotton, wool, or worsted, characterized by rounded cords running warpwise of the web. The corded effect is similar to that of corduroy, but is produced by heavy threads instead of a pile. The fabric is neither napped nor sheared. It is used for women's suits, and the worsted Bedford cord is in use for horsemen's trousers.

Bedlam, a corruption of Bethlehem. The priory of St. Mary of Bethlehem, London, founded in 1247, was afterward converted into a lunatic asylum known as Bedlam. From its use to designate this particular madhouse, the term has come to denote any scene of uproar and wild confusion.

Bedouins, bĕd′o͝o-ēns, nomadic Arabs. The name is Arabic, meaning dwellers in the desert. The term is used to distinguish those tribes that still live, as in the days of Abraham, by means of their herds. The Bedouins live in tents. They raise cattle, horses, sheep, and camels. They move with the season from place to place in search of pasturage. Their herds and flocks are their care, but they have a reputation for being fond of the excitement and the booty to be had from plundering travelers and caravans. A Bedouin attack is not unlike an Indian raid in method, and is on quite as high a plane as the border foray of Scottish song and story. Bedouin tribes inhabit the interior of Arabia and the Sahara region. They may be found in parts of Syria and in outlying parts of Egypt as well. Some tribes have engaged in the slave trade. No hard and fast distinction can be drawn between Bedouins and other Arabs, for some tribes dwell both in tents and in houses, according to the season of the year. The women grind meal by hand and weave coarse cloth. When not in the saddle, the men lie around telling endless tales. The Bedouins profess a crude Mohammedanism. They are governed by tribal sheiks and cadis.

Bee, a honey-making insect allied to the wasp and the ant. There are two or three hundred species. Some are solitary, each female bee making a cell somewhere in which to place her own eggs. Some species lay their eggs in the cells of other bees, and hang around themselves to be fed. Several species of mining bees associate to the extent of digging a tunnel or shaft in common, from which each female leads off a cross shaft for her own cell. Other species again, some of which it is difficult to tell from wasps, make mud cells or bore tunnels in twigs, or piece bits of leaves together into thimble-shaped cells, but always for the purpose of storing a drop of honey and an egg that the helpless, footless grub may have a home and food until it grows and changes into a bee. Wasps fill their cells or feed their young with insects, though oftentimes eating nectar themselves; but bees do not meddle with insects. They feed honey and pollen to their young and they eat honey.

Of social bees that build combs in common, our native species are all bumblebees. The ordinary hive bee has been introduced from Europe. Wild bees hiving in the woods are European bees that have escaped from domesticity, some of them in colonial days. We have about fifty species of native bees or bumblebees. When winter comes the bumblebee queen hides away. The rest of the family perish, and in the spring the queen comes out, lays eggs, and starts a new family. One of the best paragraphs written by entomologist Comstock is the following tribute to this cheerful American:

The clumsy rover, the bumblebee, is an old friend of us all. As children we caught her off thistle-blossoms and imprisoned her in emptied milkweed pods, and bade her sing for us. We robbed her nest in the hayfield, and tried to believe that the strongly-flavored honey, mixed with dirt, was delicious. And all our lives the sound of her droning has brought to us visions of blue skies, roadsides golden with buttercups, and fields purple with clover blossoms. And she has deserved all the attention and affection bestowed upon her, because she is usually good-

natured and companionable. She is a happy-go-lucky insect, and takes life as it comes without any of the severe disciplining and exact methods of her cousin, the honey bee.

Emerson has caught the same note:

> Burly, dozing bumble-bee,
> Where thou art is clime for me.
> Let them sail for Porto Rique,
> Far-off heats through seas to seek:
> I will follow thee alone,
> Thou animated torrid-zone!
> Zigzag steerer, desert cheerer,
> Let me chase thy waving lines:
> Keep me nearer, me thy hearer,
> Singing over shrubs and vines.

Maeterlinck's *Life of the Bee,* although not a technical or scientific treatise, is very interesting. Lubbock's *Ants, Bees, and Wasps* should be read by one interested in these insects.

The honey bee most valued by bee raisers is the Italian bee. The importation of Italian queen bees in tiny cages provided with bee food is a regular part of the business. The domestic arrangements of bees have been the subject of much study and guesswork. There are three kinds of individuals in a bee colony—drones, workers, and a queen. A strong hive contains several hundred drones and 35,000 to 40,000 workers. The drones are the males. They are broader and blunter than the workers. They have no sting. They do no work. Usually at the end of the swarming season they are killed by the workers, or driven from the hive, although, if food be plenty, the massacre may not be complete. The workers are undeveloped females. They gather honey, build combs, fill cells, feed the young bees, defend the home, and keep it tidy. The queen is the honored head of the colony. She lays eggs at the rate of 4,000 a day, producing two or three new swarms each season. The queen bee often lives four to five years, the workers live but a few months or often but a few weeks, and the drones until killed by the workers.

The first need of a new swarm of bees, once it has found a hive or hollow tree, is beeswax to build combs. A delegation of the workers gorge themselves with honey and hang themselves up like a curtain, clinging one to another from an overhead surface. In a day's time wax begins to ooze from wax pockets in the crevices of their abdomens. The other workers gather this wax from their comrades, and proceed to build the six-sided cells of a honeycomb. The comb cleared of honey is the beeswax of commerce. The workers consume twenty-one pounds of honey in producing one pound of wax. The cells are of two sizes. In the larger cells, the queen bee lays eggs that hatch into larvae that in turn become drones. In the smaller cells eggs are deposited that in the end produce workers. The young larvae (grubs) appear in twenty-one days and they are footless and helpless. Both young drones and young workers are tended by the workers and fed on honey and beebread. Beebread is made from the pollen of flowers, and is collected on their hind legs by the workers.

A queen bee is reared by stimulating an extraordinary growth of one of the larvae from which a worker is ordinarily reared. The workers usually cut away the cell walls of three adjacent worker cells, and make one large cell. They destroy two of the eggs and feed the larva of the third an extraordinary quantity of "royal jelly," an exceedingly rich food excreted from the mouth of a worker. When this well-fed larva emerges from the cell, a full-fledged queen, rivalry ensues. Many of the workers support the new queen and the old queen leaves, secedes, "swarms" with a large body of her followers and establishes a new colony. When a second queen bee hatches history repeats itself, and a second swarm leaves the hive. If several queen bees mature at the same time, a battle royal ensues between them. The workers allow them to use their enormous stings on each other till all but one are dead. They honor the survivor and carry her dead rivals out of the hive.

Bees are inactive in winter, yet need some food. This they store up in the form of honey. The mouth parts of the workers are prolonged into a sort of tube which is inserted in flowers, in search of nectar. The nectar is stored in the honey stomach of the bee and then deposited in the honeycomb. White clover yields excellent honey, but the bee is unable to

1. Swarm. 2. Honeycomb. 3. Drone; (3a) head enlarged. 4. Queen bee; (4a) head enlarged. 5. Worker; (5a) head enlarged. 6. Larva. 7. Chrysalis of drone; (a) under view; (b) side view. 16. Head and mouth parts of worker. 17. Hind leg of worker; (17a) Brush. 18. Antenna greatly enlarged.

BEES.

8. Hornet. 9 Bee Wolf. 10. Wasp. 11. May beetle; (a) male; (b) female; (c) larvae of same on flower. 12. Bee beetle; (a) larva of same. 13. Hump back fly enlarged; (a) larva enlarged. 14. Wax moth; (a) caterpillar of same. 15. Bee louse, enlarged.

ENEMIES OF THE BEE.

reach the nectar of red clover. Basswood honey is considered superior. Bears are fond of honey and are determined to have it, despite the stings of the infuriated bees. Not infrequently a swarm of bees, robber bees, attacks the hive of a weaker colony, and carries the honey away. Kipling's *Junglebook* gives a vivid account of an invasion of "red dogs" that got into difficulty among the bees.

The bee hunter or woodsman in search of wild honey carries a bit of honeycomb into the woods. When a bee settles on it to extract honey, he sprinkles flour on her so that he can mark her flight easily. After a number of these powdered insects have established a line leading in a definite direction into the woods, the hunter seats himself in a new position some distance at one side, and establishes a new line of direction. Where these lines seem to cross he expects to find bees going in and out of a tiny hole high up, it may be, in some old tree. First he frightens the bees by smoke. They think their house is going to be burned, so they fill themselves with honey, and are no longer "cross." Then he fells the tree, cuts open the cavity, and carries the honey home.

Various locations have been celebrated for honey. The promised Canaan was a "land flowing with milk and honey." Mount Hymettus in Greece, and Sicily were celebrated among the ancients. As previously stated our choicest strains of bees come from the Apennines of Italy. The honey of Switzerland is famous for clearness and purity. The Scotch carry their beehives to the mountains for a few weeks when the heather is in bloom.

A belief, deep seated in Greek, Roman, and medieval superstition, to the effect that, in addition to ordinary methods of reproduction, honey bees sprang by spontaneous generation from the carcasses of dead animals, particularly of oxen, is now thought to have had this foundation. A fly with much the appearance of a bee, only a little larger and having one pair of wings, is hatched from a rattailed maggot that infests carcasses. It has been suggested that the supposed bees were newly produced flies of this sort.

By the census of 1920 there were in the United States 3,467,396 hives of bees, allocated by geographic divisions as follows:

New England	41,073
Middle Atlantic	262,728
East North Central	556,344
West North Central	497,471
South Atlantic	613,171
East South Central	585,323
West South Central	422,492
Mountain	206,005
Pacific	282,789

The amount of honey produced in 1920 was 55,814,890 pounds valued at $14,280,-153, and of wax, 820,529 pounds valued at $5,992,083. The following states, in the order named, reported the largest number of hives: Texas, Tennessee, California, North Carolina, Illinois, Missouri, Kentucky and Alabama. In 1919 the following six states reported the greatest amount of honey produced: California, 5,501,738 pounds; Texas, 5,026,095 pounds; New York, 3,223,323 pounds; Iowa, 2,840,025 pounds; Wisconsin, 2,676,683 pounds; and Colorado, 2,493,950 pounds.

In the comparison of the fourteenth with the thirteenth census of the United States a slight increase in the production of honey is noted for 1920 over 1910. In the latter year 55,000,000 pounds were produced.

The value of the 3,467,396 hives of bees reported in the United States in 1920 was $16,841,353, this being greater by more than $6,000,000 than the value of the 373,-000,000 head of poultry reported in the same year.

Despite the large production of honey and wax in the United States, large quantities of each of these products are imported each year. The introduction of scientific methods into apiculture, and the dissemination of knowledge pertaining to the industry, however, bids fair to increase the production totals. The modern bee keeper studies his workers with as much diligence as does the stock raiser his animals. Diseases that might ravage so homogeneous a unit as the bee colony are investigated with a view to eradication, and hives are constructed with as much care, comparatively, as are dairy barns. See ANT; WASP.

Beech, a handsome, well known forest tree. The American beech is found from Texas and Wisconsin to Florida and Nova Scotia. It is closely related to the chestnut. The beech is preëminently a forest tree, growing to a height of 80 or 100 feet. The early settlers along the Ohio had tremendous work to clear off the beech forests. The stumps soon decay and the soil of a beech grove is of the richest. The European beech grows readily to a height of 100 to 120 feet, and is a magnificent park tree, "the warlike beech," Spenser calls it; but it branches too soon to have a trunk equal to that of the American beech. Blue beech is not a beech at all, but a birch, and a relative of the ironwood or hop hornbeam. Beech nuts are of a triangular shape and about the size of peas. They are a favorite food of swine, bears, squirrels, and many wild animals. Daniel Boone and the settlers of Kentucky knew where to find bears and wild turkeys when beech mast was ripe. Buckwheat or "beech wheat," as it should be called, is so named from the resemblance of its kernel to a beech nut. Beech wood makes excellent fuel, ranking with hickory and maple. The timber makes excellent handles for tools. The lumber does not last well in exposed situations, but is enduring under water. It makes excellent material for dams, watermills, sluiceways, etc. As the wood is without odor and is not subject to checking, it is much used for the wooden boats in which grocers sell butter, pickles, and many other articles.

Beecher, Henry Ward (1813-1887), an American clergyman. He was born at Litchfield, Connecticut, June 24, 1813, and died at Brooklyn, New York, March 8, 1887. He was a member of the famous Beecher family. The father, Dr. Lyman Beecher, was instrumental in the founding of Lane Seminary at Cincinnati, and was one of the most influential clergymen of his day. He was the father of thirteen children, including Harriet Beecher Stowe, Isabella Beecher, Henry Ward Beecher, and seven other clergymen. He was credited with being the "father of more brains than any other man in America."

Henry Ward was a shy boy, and wanted to go to sea. After graduating from Amherst and studying theology at Lane, he edited an anti-slavery paper in Cincinnati. He was pastor at West Sutton, Massachusetts, and then at Indianapolis. In 1847 he accepted the pastorate of Plymouth Church, Brooklyn, with a roll of but nine members. Under his charge, the church became one of the largest and most noted in the United States.

Mr. Beecher had a reputation as a pulpit and platform orator second to none. He ranked with Spurgeon and Talmage in ability, but added to their fervent eloquence an element of culture and scholarship that they did not possess. During the political struggle that preceded the Civil War, Beecher agreed in politics with Abraham Lincoln that slavery should be unmolested in the territory it then occupied, but should not be allowed to expand. He spoke so often and so powerfully against slavery, however, that he was classed by the Southern leaders with Garrison and Wendell Phillips, and was hated thoroughly as a black abolitionist. During the Civil War, he undertook a series of lectures in England with a view to creating sentiment for the North. His experience in Manchester before an immense audience of mill hands, who had been thrown out of work because Southern cotton could not be obtained, is one of the most remarkable instances of oratorial pluck and endurance on record. The workmen hooted at him, and attempted to yell him down, but Beecher felt that he stood before the audience as the representative of the American flag. He held on, appealing to the Englishman's love of fair play, until he won their attention, and told them what he believed to be the merits of the great contest then carried on between the two sections of the American Union.

He supported President Johnson in his policy of reconstruction, took part in the Greeley movement against Grant's second term, and voted for Cleveland in 1884.

He was a constant advocate of free trade and of suffrage for women.

Mr. Beecher was a contributor to the *Independent* for twenty years, and at one time acted as its editor. He founded the *Christian Union*, now known as the *Outlook,* and was for a long time a contributor to the *Ledger*. His works fill many separate volumes, but have not been brought together in a uniform edition.

See STOWE.

Beecher, Lyman (1775-1863), an American theologian, born at New Haven, Conn., was graduated from Yale University in 1797, and became pastor of the Presbyterian church of East Hampton, L. I., in 1798. Dr. Beecher's sermon on the death of Alexander Hamilton at the hands of Aaron Burr in 1804 won him immediate fame. He was soon known as one of the leading preachers of the country. A half dozen of his sermons against intemperance were widely read in America and England, and were even translated into foreign languages. In 1826, he became pastor of the Hanover Street Congregational church of Boston, and in 1832 accepted the presidency of the Lane Theological Seminary, near Cincinnati, Ohio. He held the office for 20 years, during 10 of which he was also the pastor of the Second Presbyterian Church in Cincinnati. When the Presbyterian Church divided in 1838 Dr. Beecher adhered to the New School party. Resigning the presidency of Lane Seminary in 1852, he returned to Boston to prepare his works for publication, but his mental powers began to decline and he was forced to retire.

Beef, the flesh of domestic cattle. The name was introduced into England by the Normans. It was spelled at first as in the last syllable of Front-de-Boeuf in Scott's *Ivanhoe*. All qualities considered, beef is the most desirable kind of meat. If mankind were restricted to one kind of meat, the choice would undoubtedly be beef.

The United States is the greatest producer of prime beef among the nations, and in the United States and Canada the consumption per capita is greater than in any other country. England is next in order as a beef consumer, and France, though exact figures are not available, probably follows England. As producers, Argentina and Australia have lately come to the fore. In 1921 the United States produced 2,338,000 tons of beef, considerably less than she produced in either 1919 or 1920. In the same year the United States exports of beef were 25,000 tons, a great falling off from the period between 1914-19, when the United States was supplying the allies.

CANADIAN PRODUCTION. This was, in 1920:

150,000 tons sold fresh, worth about	$60,000,000
5,000 tons, salted.....	9,000,000

There was a marked falling off from these figures in 1921, due to the general business depression.

Beer, a malt beverage. It is fermented but not distilled, belonging in this respect to the same class as ale, stout, and porter. It is composed largely of water and contains starch, sugars, the bitter principle of hops, and about four per cent of alcohol. Beer is made from wheat or any of the cereals, but chiefly from barley.

In the simplest language malting is sprouting the grain. Barley is steeped in water for about two days; then heaped up in small piles on a floor in a moist, warm room to sprout. The piles are shoveled over frequently to avoid spoiling, and the grain is watched with solicitude until, at the end of four or five days, tiny hair-like roots appear. The growth is then checked by drying promptly in a kiln until the grain is dry and brittle. The malt, as it is now called, is tumbled about and put through a blower or fanning mill to remove dust, shrunken kernels, and roots.

In brewing the malt is first crushed to liberate the starch grains. The ground malt is then cooked into a mash. For various reasons, to reduce cost of production and to make a lighter color of beer, a separate mash, possibly three times as great, is made of unmalted rice or corn grits, corn meal, corn starch, possibly potato starch. The two mashes are then run together and boiled in an abundance of water in large tubs. The process started in the sprouting of the malt continues to

convert starch, not only of the malt, but also of the corn products, into sugar. After various periods of boiling, stewing, stirring, and settling, best known to the brewer, the liquid, now called wort, is drawn off from the mash into kettles. The mash is washed pretty thoroughly for wort and the leavings, including the hulls of the original barley, are sold for feed. Other cheapening but not undesirable materials are usually added to the wort, particularly sugar, glucose, and molasses. Hops, a very important ingredient, are now added, for, it is said, three distinct purposes. The tannin clarifies the wort by coagulating the albumen; the hop oil gives the beer a certain hop aroma; and the hop resin gives a bitter taste supposed to be desirable.

Previous to the adoption of the XVIII Amendment, prohibiting the manufacture and sale of spirituous and malt liquors after January 1, 1920, the brewing industry in the United States had reached enormous proportions, being exceeded by that of Germany and the United Kingdom only. Consumption of malt liquors in the United States was 2,056,407,108 gallons in 1914, or 20.54 gallons per capita. It was reduced to 1,556,378,953 gallons, or 14.59 per capita, in 1918, during the war period; and under prohibition, was reduced to 285,798,939 gallons in 1921, or 2.61 gallons per capita of population. Much beer is still illicitly brewed and sold, but the manufacture and sale of beer containing more than one-half of one per cent of alcohol is expressely prohibited by Act of Congress (the *Volstead Law*).

In Canada the laws of the various provinces differ as to the manufacture and sale of beer, which is permitted, for instance, in Quebec and British Columbia, but prohibited in Ontario, except for medicinal purposes. Under the Canada Temperance Act of 1920, as amended in 1922, the sale in or exportation out of each province of all intoxicating liquors is restricted to brewers and distillers duly licensed by the dominion. But the provisions of the Dominion Act are applicable to each province only upon its own request, so that in Canada the status is practically that of provincial local option. There are, as a rule, no restrictions on the brewing of beer at home for family use.

Beet, a well known vegetable belonging to the pigweed family. The original beet still grows wild in southern Europe and in parts of Asia. From it have been developed the garden beet, the chard, the mangel, and the sugar beet. The original beet had a slender root. The top was used for greens. The root has developed under cultivation. The chards were cultivated by the Greeks over 2,000 years ago. The development of table beets has gone on for many centuries. The rich, red, smooth, tender, shapely beet of today is the result of planting the seed of the beet in rich garden soil century after century.

The coarser, unimproved varieties of beets are known as mangels. Seeds were brought from England by the earliest colonists. Mangels are still raised as a standard field crop for feeding cattle. Sheep do well on sliced mangels. A mangel clapped on a long nail in the wall of the chicken house affords an excellent winter diversion for laying hens.

All varieties of beets are biennial. Like turnips the root of one year produces seed the second year and then dies. In all cold countries it is necessary to pull the seed beets and store them in a dry, cool, frost-proof cellar or root house. Owing to the higher cost of American labor, we import a large proportion of our beet seed from Europe.

The discovery of sugar in the beet dates from 1747. Credit is due to a German chemist. No important commercial results followed until experiments were renewed under the direction of Napoleon, who ordered ten factories to be built in France. With the exception of Turkey, all European countries now produce beet sugar. More beet sugar is now produced than is made from cane. The world's output for 1922 was 5,367,000 long tons, of which the United States produced 625,000. A number of attempts to set up beet sugar factories in the United States at Philadelphia, Northampton, Massachusetts, and elsewhere,

were unsuccessful. In 1869 the beet sugar industry was established at Alvarado, California. A wide strip of territory, extending clear across the United States, has been found well suited to the production of sugar beets, and a large amount of American capital is now invested in the production of beet sugar.

The difficulty of getting out the sugar without the red coloring matter led to the breeding of a beet from the lightest colored mangels. The present sugar beet is as white as a turnip. By planting the seeds of the sweetest beets, the yield of sugar has been increased from 100 pounds of sugar to the ton of beets in Napoleon's factories to an average of perhaps 250 pounds to the ton in 1908.

Beet seed—ten to fifteen pounds to the acre—is sown in drills about the time of corn planting. The seed should be covered about three-fourths of an inch. The drills should be about three feet apart, and the young plants should be thinned in the row to stand two to three feet apart, giving 5,000 to 7,000 beets to the acre. Rich clay loam soil seems best. The irrigated lands of the west yield famous crops.

Beets are dug by a double shoe plow or lifter. The beets pass between the shoes and are elevated. They are then topped close by hand and thrown into heaps to wait convenience in hauling. Loading is done with forks. The railway sidings in beet countries are furnished with elevated platforms from which the farmer dumps his load of beets into a flat car. Freezing does no harm. In Minnesota beets go to market as hard as rocks.

Arrived at the factory the roots are washed clean and sliced, this all by machinery. The sugary juice is extracted by soaking the pulp in water that is changed frequently. It is treated with limewater and sulphur. It is filtered and evaporated, purified and bleached. The sugar is finally sacked and sent to market. The discarded pulp is sold for stock food.

In the decade 1910-20, the peak year for beet sugar production was 1913-14, when the world's total was 8,929,000 tons. With the outbreak of the World War European production fell off, and has not since attained its pre-war status. There were in 1919 85 beet sugar refineries in the United States, allocated as follows: 16 each in Michigan and Utah; 14 in Colorado; 10 in California; 8 in Idaho; 5 in Ohio; 4 each in Nebraska and Wisconsin, and 1 each in Indiana, Illinois, Iowa, Kansas, Minnesota, Montana, Wyoming and Washington. The United States imports more sugar than 300 factories running continuously could supply.

Beethoven, bā′tō-ven, **Ludwig van** (1770-1827), a German musician, born at Bonn. He was of Dutch descent, hence the *van*. His father, a tenor singer in the elector's chapel, is said to have whipped Beethoven at the age of five to make him practice. At thirteen the lad published a volume of musical compositions. Seeing his precocity, the elector of Cologne sent Beethoven to Vienna to enjoy the instruction of Haydn, who made him familiar with the music of Handel and Mozart. He became attached to Vienna and remained there the greater part of his life. He held various positions, such as chapel master, and drew a liberal pension. He was naturally eccentric. Dyspepsia made a short temper worse. A growing deafness rendered him incapable of conducting concerts, and, finally, total deafness drove him out of society. Like all musicians he was sensitive and fond of praise. In his later years he became morose. He remained single all his life. Singular habits of abusing his friends and servants by spells rendered it difficult for him to maintain a home. He was a man of short stature, and had long hair and black, piercing eyes.

Beethoven's compositions are numerous and are regarded as the works of a genius. He worked by no rule, but seemed to compose offhand under the stress of his feelings. Deafness and a bluntness of character led him to hold aloof from society and wander about in byways alone. Returning from these trips, he was wont to jot down his feelings in musical notation to be elaborated later. Nevertheless he wrote with care. One of his notebooks shows that he revised one piece eighteen

times. Many critics deem him the greatest of musical composers. Others say he is preëminent in orchestral music only. He wrote also for the voice, for the piano, for the violin, and for the cello. He wrote songs, symphonies, operas, sonatas, and other forms familiar to the student of music.

One of Beethoven's most popular compositions is the *Moonlight Sonata.* A story is told concerning its production which gives no doubt a clue to the real nature to be found beneath the musician's rough exterior. While walking one moonlight evening in a poor quarter of the city of Bonn, the musician was led to enter a very humble dwelling by hearing the strains of one of his own compositions. He discovered the performer to be a blind girl living with her brother in poverty. Beethoven seated himself at the old-fashioned harpsichord, and for a long time delighted the blind girl with his playing. At last the light of the single candle in the room flickered and went out. The shutters were thrown open, and there, inspired by the beautiful moonlight and the humble listener to whom he was giving so much happiness, Beethoven improvised his *Moonlight Sonata.*

Beetle, a large order of insects, including eighty American families and 11,000 species. Beetles may be distinguished from bugs by the wings. Both bugs and beetles have two pairs of wings. The forward or outer pair of the bug are horny with gauzy tips that overlap on the back. The outer pair of the beetle are heavy and horny throughout, and meet in a straight line along the back. In fact the horny outside wing covers of the beetle are not wings at all, but horny scales under which a pair of fine, thin wings are folded with occasional vestiges of front wings. When the beetle desires to fly it raises its wing covers, spreads its wide, thin wings, and sails away, frequently with a humming or whirring noise. Some beetles are poor flyers. As a rule, the better a runner, the poorer a flyer it is. The mouth parts are strong. The beetle has six legs and two usually well developed antennae.

The life of the beetle consists of four stages: the egg, the larva or grub, the pupa, and the developed insect. The female beetle deposits her egg where she thinks there will be an abundance of food. From the egg comes a grub, of which the grub-worms, large and small, of manure piles are familiar examples. They are grubs, not worms. They correspond to caterpillars and have six stiff legs. The sole business of the grub is to eat and grow. As it grows, it sheds its skin every now and then for a new and larger one. When it has its size, which it may attain in a few weeks or years according to the species, it builds itself a rude shelter of bits of wood, or a case of silk, and goes into a state of rest, the pupa stage, in which the folded legs and wings of the beetle may be seen. It then remains quiet until the full-sized beetle is ready to break forth, hunt food, spread its wings, and lay new eggs.

There are many interesting beetle families. On hot, bright days bronze and green fellows, beautifully marked with yellow, spring from the dusty road and fly a few rods ahead, turning as they light, so as to sit with an eye on the traveler. These are tiger beetles.

The ground beetles have large, plump, green, blue, violet, brown, and spotted, but mostly black bodies and long, slender feelers. One small sort has a magazine of disagreeable fluid at the rear of its abdomen which it flings into the face of an astonished enemy. The fluid fills the air with smoke, under cover of which the little soldier scuttles away.

Black, shining, diving beetles hang head downward at the surface of quiet pools watching for insects to eat. Like other insects, they breathe through tubes or nostrils on their sides. They can carry a lot of air to breathe imprisoned under their wing covers. They are not inconvenienced by diving.

Whirligig beetles seem to spend most of their time whirling around, sometimes quite a swarm of them, on the surface of quiet water. They dive and they fly from one pool to another, but depend rather on their agility when one tries to catch them.

The carrion beetles include the burying beetles, large, stout, cylindrical fellows with reddish spots. When a pair of these humming about find a dead mouse or other carrion, which they are supposed to detect for a long distance, they light and go to work digging away the earth beneath, until the animal is quite buried in a pit. The female then lays her eggs in the animal. Comstock states that a pair of these beetles will roll a rat several feet, if need be, to find a spot suitable for burying.

Quite a number of species make trouble. The carpet beetle fills carpets with grubs; the pale raspberry beetle covers the raspberry leaves with small white grubs. Apple tree borers ruin an orchard. The cigarette beetle infests tobacco factories. The ship-timber beetle honeycombs wooden ships. The rose beetle destroys our choicest rosebuds. The meal worm plagues the miller. The sugar-cane beetle works its way into the base of sugar-cane and is a serious pest in Louisiana. The maple, the elm, the hickory, the willow, the oak, and nearly every other tree has its beetle that bores in the twigs and deposits grub-producing eggs from the later effects of which the twigs and even trees die.

Beetles are interesting but hardly attractive. As an order they are hostile to the fruit grower. Longfellow, in defending the cause of birds, audacious fruit thieves, takes this view:

> Even the blackest of them all, the crow,
> Renders good service as your man-at-arms,
> Crushing the beetle in his coat of mail,
> And crying havoc on the sluggard snail.

See INSECTS; BUG; POTATO BEETLE.

Begonia, be-gō′nĭ-ȧ, a large group of juicy flowering plants, known also as elephant's ear, and beefsteak geranium. There are about 300 species chiefly of tropical America, although some species are found in Asia and South Africa. The first begonia known in England, was introduced in 1777. Florists recognize four groups: the fibrous-rooted or winter-flowering; the semi-tuberous; the tuberous or summer-flowering; and the rex or ornamental-leaved. Begonias may be propagated without difficulty by leaf or stem cuttings.

Belasco, David (1859-), American playwright and producer, made his first appearance on the stage at the age of fifteen. For a time he was stage manager of the Madison Square Theatre, New York. His dramatic works include *Zaza, The Girl of the Golden West, Naughty Anthony, The Darling of the Gods, The Son-Daughter, The Return of Peter Grimm,* and a number of other plays and adaptations. He is very successful as a manager.

Behring Strait. See BEHRING SEA.

Beirut, bā′rōōt, the chief seaport of Syria which now forms a part of the new state of Palestine. It is situated on a bay near the middle of the eastern coast of the Mediterranean. A railroad leads inland over the Lebanon Mountains to Damascus. During the past fifty years Beirut has grown from a town of 10,000 to a commercial city of 120,000 people. The United States maintains a consul at Beirut, and various American and European societies support mission stations. The exports are silk, rugs, grain, olive oil, tobacco, wool.

Belfast, the chief commercial and manufacturing city of Ireland. It is situated at the head of a bay on the northeast coast of the island, and is nearer to Glasgow than to Liverpool. The country round about is strongly Protestant. Belfast is scarcely less Presbyterian than is Glasgow. It is situated on low ground made by the alluvial deposits of a small river. As late as 1612 it consisted of 120 mud huts thatched with straw, so that it did not have much the start of Boston. Its present population is about two-thirds as great as that of Boston. The country round about is productive, and insures the city a thriving trade. The region is noted for the production of a superior quality of flax, which has made Belfast the leading linen city of the world. Immense factories are engaged in flax spinning and in linen weaving. Oil mills, distilleries, flouring mills, shipyards, foundries, sawmills, printing offices, manufactories of felt and tobacco, and rope works add to the business interests of the city. Commercially it is the fifth city in the United Kingdom. The city is built of brick. The streets are spacious and well kept. Five bridges

span the river. There are evidences of commercial thrift, churchgoing, and education on every hand, as well as signs of vagabondage and poverty; but the antiquities for which the tourist looks in a European city are wanting. There are several educational institutions including Queens' College and the Presbyterian Theological College. See IRELAND; LINEN.

Belgian Congo, an African colony of Belgium. The area is estimated at 909,654 square miles, with a Bantu population of about 393,000.

The history of the so-called Congo Free State is interesting. In 1876 Leopold II, king of Belgium, was eager "to get into the African game." He founded the International African Association, subcommittees of which were presided over by the Prince of Wales for England, the Crown Prince for Germany, the king's brother for Italy, M. de Lesseps for France, and the king himself for Belgium. Large sums of money were subscribed, and exploring stations were established in the Lake Tanganyika region. When, in 1877, Stanley appeared on the Atlantic coast with the story of the Congo River, King Leopold saw, he thought, an opportunity to acquire African territory. Acting ostensibly for the association, but using his own money, Leopold employed Stanley for five years in visiting the tribes of the Congo Valley, and in establishing trading posts. During this period, Stanley secured 4,000 concessions of territory from native chiefs. Over 2,000 chiefs placed their marks on these documents. Light steamers in "knock-down" were taken up the Congo as far as seagoing ships could navigate. They were then carried by natives around the cataracts and were put together and set afloat in Stanley Pool.

In this way, a vast extent of territory was taken possession of in a peaceable manner, with the utmost goodwill of the simple natives. A little later, the "Congo Association," in reality Leopold's employes, adopted a flag having a gold star and a blue ground, and applied to the powers for recognition as an independent state. The diplomatic situation was a very peculiar one. A trading association without definite boundaries, or standing as a nation, asked for recognition and got it. By the Treaty of Berlin, signed 1885, the Congo Independent State was placed under protection of Leopold. From this date on, Leopold considered the Congo Valley a personal possession. The Belgian government took $2,000,000 worth of shares in a railway, 250 miles long, with which to connect the lower part of the river with Stanley Pool, and in 1890 made a further loan of $5,000,000 to the Independent State.

The nations were well pleased for a time. The world at large was glad to see the territory tied up so that it could not be grasped by any of the larger powers. The term, "Independent State," sounded well. No one was particularly jealous of Leopold. Rumors, however, began to creep out that the king was administering the state for revenue only, and that his agents and emissaries, resorting to measures of the utmost cruelty, were enslaving the negroes and forcing them to bring forest products to the various river ports. The affair was the subject of more or less diplomatic correspondence. In 1908 the estate was annexed to Belgium by a legislative act approved by the king. Germany, and later, the other powers, gave formal consent.

By the Paris terms a part of German East Africa is ceded to Belgium, thus enlarging the resources of the Congo Free State. As stated, the population of Belgian Congo is above 15,000,000. In January, 1921, the population of European employes numbered 8,221. Forty-seven hundred of these were Belgians. The rest were English, Portuguese, Swedes, Norwegians, Americans, Italians, Danes, Dutch, Germans, Austrians, Swiss and Russians. There are 149 missions and 1,150 missionaries, rather more than half of whom are Catholics. There are three agricultural colonies where children are taught the rudiments of reading and agriculture.

The exports are chiefly forest products, including rubber, ivory, palm nuts, palm oil, and white copal. Large sections are well adapted to the cultivation of coffee and cocoa. Plantations of rubber have

been established. Tobacco is grown by the natives around their villages. Gold, tin, and copper are also exported. The exportation of diamonds in 1920 was 274,103 carats. In 1920 the exports were valued at $60,000,000. In the same year, arms, ammunition, ships, machinery, liquors, groceries, cotton cloth, clothing, glassware and cutlery to the value of $45,000,000 were imported.

There are seventeen steamers in the ocean section of the Congo. Forty-six ply on the Upper Congo. There are about 2,663 miles of railway with 1,000 miles under construction. It is proposed to unite the mouth of the Congo with the great lakes of Central Africa. The Congo is included in the Postal Union. Boma, at the head of deep sea navigation, is the capital. There are 2,085 miles of telegraph line. Belgian money is current on the lower part of the river. Among the forest tribes barter prevails, though bits of brass and cowry shells serve as a sort of currency.

Belgium, a small country of Western Europe, bounded on the north by Holland, on the northwest by the North Sea, on the south and west by France, and on the east by Germany and the Duchy of Luxembourg. The coast line of Belgium measures 42 miles; it has an area of 11,744 square miles, and a population of 7,684,272. Her pre-war area and population were somewhat smaller than at present, for by the Treaty of Versailles she was ceded by Germany the districts of Eupen and Malmedy, having an area of 384 square miles and 64,520 inhabitants. The capital is Brussels.

Belgium slopes northward toward the North Sea as a broad plain. The southern part is quite rugged and elevated, the Ardennes continuing into this part of Belgium from France. The North Sea regions are so low that embankments are erected to keep the sea out. Belgium is more favored in the matter of waterways than any other European country. The principal rivers are the Scheldt, with its tributary the Lys; the Meuse, with its tributary the Sambre; and the Yser, Demer, Dender, Great and Little Nethe, Dyle, Darme, and Ambleve.

INDUSTRIES. The industrial life of Belgium depends upon mining and agriculture chiefly, and upon the metal and textile industries. Agriculture is of the intensive rather than extensive kind, Belgium obtaining a greater output per acre of some crops than any other country on the continent. The invasion of this peaceable and intelligent little country by the German forces resulted in an almost complete wrecking of her industrial plants, but nearly complete industrial rehabilitation has since been attained. The chief industry of Flanders, and one of the oldest in Belgium, is the linen industry. The name of Brussels, in the textile marts of the western world, is always associated with lace. Mons, Namur, Ghent, Liege and Charleroi are the principal centers of the metal industries. Glass manufacture is also highly developed.

COMMERCE. Belgium is one of the chief trading countries of the world. This fact is the more noteworthy when her size and population are considered. The chief articles of import are food and raw material, while exports consist of manufactured goods of infinite variety. She exported extensively into Germany before the war, but trade in that direction has since declined. Her transportation facilities are an important factor in her trade relations. She has more miles of railway per square mile than any other country in the world, and 1,360 miles of navigable waterways.

GOVERNMENT. Belgium is a constitutional, representative, hereditary monarchy, and her national existence dates back to 50 B. C. Absolutely equal suffrage obtains. Legislative power is vested in the king, a senate and a house of representatives. Senators are elected for four years, a part of them directly by the people, and the remainder by the provincial council. Representatives are chosen by direct vote of the people, one for every 40,000 inhabitants. Each of the nine Belgian provinces is under the authority of a governor, appointed by the crown, and a provincial council elected by vote of the people. The commune is the unit of local government; and both province and commune enjoy considerable autonomy.

EDUCATION. School attendance in Belgium is compulsory between the ages of six and fourteen. Each commune must have at least one primary school, maintained by the commune with state and provincial aid. Secondary education is provided for by 148 schools; there are 99 normal schools, 6 commercial high schools, a state agricultural institute, a state veterinary school, the Royal Academy of Fine Arts, and 4 universities; those at Ghent and Liège are state institutions, while those at Brussels and Louvain are free. Groups of technical schools are attached to the universities.

HISTORY. The Kingdom of Belgium formed itself into an independent state in 1830, having from 1815 been a part of the Netherlands. The secession was decreed on October 4, 1830, by a Provisional Government, established in consequence of a revolution which broke out at Brussels on August 25, 1830. A National Congress elected Prince Leopold, of Saxe-Coburg, King of the Belgians on June 4, 1831; he ascended the throne July 21, 1831. On his death in 1865 he was succeeded by his son, Leopold II., who reigned until 1909.

By the Treaty of London, November 15, 1831, the neutrality of Belgium was guaranteed by Austria, Russia, Great Britain and Prussia. It was not until after the signing of the Treaty of London, April 19, 1839, which established peace between King Leopold I. and the King of the Netherlands, that all the states of Europe recognized the Kingdom of Belgium.

In pursuance of her declaration of war against France, Germany invaded Belgium in 1914 in order to reach France from the north. Heroic resistance was offered by the Belgians, who even in Caesar's time were known for their fighting qualities, but the resistance was beaten down by the Germans. The seat of government was removed from Brussels to Antwerp, and was later transferred onto French soil, at Havre. Systematic destruction of life and property followed the overrunning of the country by the invader. Foodstuffs and machinery were requisitioned or destroyed, and thousands of Belgian workmen were deported to Germany. On November 19, 1918, the king again entered Brussels after four years of the bitterest fighting. By the terms of the Peace Treaty, Germany was compelled to consent to the abrogation of the Treaty of 1839, by which Belgium became a neutral state. Germany was required to give options over ten years for delivery of 8,000,000 tons of coal; to repay all sums borrowed by Belgium from her allies from August, 1914, to November 11, 1918; to deliver to Belgium live stock, machinery, etc., to the value of $800,000,000; and to restore certain art treasures. Belgium was granted priority claim on the payment of $500,000,000 from the German indemnities.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	11,744
Forest area, acres	1,500,000
Population (1920)	7,684,272
Chief Cities:	
Brussels	684,870
Antwerp	333,882
Ghent	165,910
Liege	165,117
Mechlin	60,118
Bruges	54,308
Ostend	48,073
Verviers	43,027
Louvain	39,450
Seraing	36,954
Courtrai	36,767
Alost	36,160
Number of provinces	9
Members of state senate	153
Members of house of representatives	186
National revenue	$ 488,902,000
Bonded indebtedness	$5,047,388,000
Farm area, acres	7,362,760
Improved land, acres	4,021,245
Oats, bushels	30,251,000
Wheat, bushels	11,523,000
Potatoes, bushels	93,329,000
Barley, bushels	3,939,000
Sugar beets, short tons	267,859
Tobacco, pounds	13,490,000
Domestic animals:	
Horses	205,152
Cattle	1,487,361
Swine	976,643
Wrought iron, tons	216,700
Crude zinc, tons	102,000
Steel, tons	1,530,000
Pig iron, tons	1,408,000
Coal mined, tons	28,000,000
Coke, tons	22,000,000
Briquettes, tons	3,500,000
Lead, tons	16,040
Sugar, tons	350,000

Imports	$2,000,000,000
Exports	$1,000,000,000
Miles of railway	5,600
Number of schools	11,325
Pupils enrolled	1,166,237

Belgium, Commission for Relief in, an international organization formed late in 1914 by the American and Spanish ambassadors in London, the American and Spanish ministers at Brussels, the American ambassador at Berlin, and the American minister at The Hague, to care for civilians in the war-devastated districts of Belgium and Northern France. It was financed by government loans from Great Britain and France. The work provided for the feeding of the entire population of the occupied areas, and some 7,000 committees were created under the control of two central organizations: the Commission for Relief in Belgium, and the Comité National de Secours et d'Alimentation. Over 3,000,000 tons of supplies were shipped and distributed.

Belize, or **British Honduras,** a British colony on the Bay of Honduras, in the Caribbean Sea, and elswhere surrounded by Guatemala and Mexico. It forms the southeast part of the peninsula of Yucatan, and has an area of 8,592 miles. The river Belize traverses the central part of the country, and the Rio Hondo and the Sarstoon form respectively its northwestern and southern boundaries.

The Cockcomb Mountains (4,000 feet) are the highest points, the land along the coast being low and swampy.

The country has the fertility of the tropics and the high parts afford good pasturage. The chief exports are bananas, cedar, chicle, cocoanuts, mahogany, logwood and Hawksbill shell. The principal imports are wearing apparel, boots and shoes, cattle, silk and cotton goods, drugs, chemicals and patent medicines, cutlery, machinery, food supplies, gasoline, kerosene and spirits.

There are a number of primary and secondary schools in Belize, all of which are under denominational management and receive no aid from the government. Telegraph and telephone lines connect Belize with Corozal and Consejo on the coast, also with towns in the interior. The Royal

See BRUSSELS; BRUGES; ANTWERP; GHENT; NETHERLANDS.

Belgrade, capital of Jugo-Slavia, formerly of Servia, is situated on the Danube, midway between Vienna and the Black Sea. It occupies a position strongly fortified by nature. The citadel is built on a lofty promontory and is a sort of Gibraltar, commanding the pass through which travel up or down the river must go. For that reason it is the key to the upper Danube. Originally garrisoned by a Roman legion, it has been fortified, stormed, surrendered, and ceded a score of times. Greeks, Turks, Austrians, and Hungarians have fought desperately for its possession. One of the most memorable sieges was conducted by Prince Eugene in 1717, when he took the citadel after he had defeated an army of 200,000 Turks "under the walls of high Belgrade." Since 1878 it has been the capital of an independent state. Its position has made it the center of communication between the Upper Danube and the Black Sea region. Lines of steamers ply in both directions. The main railway of the Danube Valley passes through Belgrade on the way to Constantinople. The population in 1911 was reported at 120,000. The city has a large wholesale and shipping business. The exports are chiefly grain, fruits, especially fresh plums, marmalade, meats, and live stock. Street railways, telephones, electric lights, waterworks, new buildings, and fine shops give the city a modern appearance. See SERVIA; JUGO-SLAVIA.

Belisarius, bĕl-ĭ-să′rĭ-ŭs (505-565), the greatest general of the Byzantine Empire, and the one to whom the Emperor Justinian owed the splendor of his reign. As a youth he served in a body guard of the emperor, who made him commander of his eastern army. He won a signal victory over the Persians in 530, and crushed a rebellion in Constantinople, saving Justinian's life in 532. He led 15,000 mercenaries against the Vandals in Africa —an expedition avoided by every other imperial general,—and returned victorious. He overcame the Ostrogothic kingdom founded in Italy by Theodoric, with such display of military skill and daring that the Ostrogoths offered to make him emper-

or of the West. This honor Belisarius loyally rejected and returned to Constantinople, to be stripped of his honors and sentenced to death through the intrigues of his disloyal wife. Only by humbling himself before this wicked woman was he able to save his life. While in trouble at home the Goths reconquered Italy and Belisarius' services were again required. With inadequate forces but with matchless skill he held the enemy at bay through five campaigns. Removed from command he lived quietly at Constantinople until an incursion of Bulgarian savages caused panic throughout the city. Then Belisarius came once more to his country's aid and repelled the enemy, but instead of rewards he was accused of conspiracy and imprisoned, stripped of honors and property. Justinian, though jealous of his loyal general, knew him innocent of treason and released him from prison. The history of his last years is uncertain, but it is probable that wealth and honor were restored to him.

"Belisarius was merciful as a conqueror, stern as a disciplinarian, enterprising and wary as a general; while his courage, loyalty and forbearance seem to have been almost unsullied."

See CONSTANTINOPLE; JUSTINIAN.

Bell, an open, cup-shaped, percussion instrument which yields a single dominant note. A bell is suspended usually mouth downward. A clapper usually hangs from the center and strikes first one side of the bell and then the other as the bell swings to and fro. Bronze bells have been found in the ruins of Nineveh. They were in use in India and China before they found their way into Europe. The Romans used bells for a number of purposes. Bells were carried and rung in processions, and were used to summon the public to the baths. One ancient author mentions a bell which rang in connection with a water clock to announce the passing of the hours.

Church bells are mentioned in Rome as early as 400; in France 550; in England 680. Some of the oldest bells in Ireland, Scotland, and Wales are quadrangular and are made of iron plates riveted together. A four-sided bell of this sort is still shown at the old monastery of St. Gall, Switzerland. Bells were brought to their present shape and stage of perfection in Holland by the middle of the seventeenth century.

First class bell metal is composed of copper and tin, in the proportion of four to one. The thickness of the lips should be one-fifteenth of the bell's diameter, and the height of the bell should be twelve times the thickness of the lip. Thus the proper proportions of a bell may be two inches for the thickness of the lip, thirty inches for the diameter of the bell, and twenty-four inches for its height. These proportions, as well as the graceful, inward curve and trumpet mouth, were all worked out by careful experimenting.

The casting of a large bell is an art in itself. A drawing must first be made giving a cross section of the bell. A pair of compasses with two crooked legs is then made. The curve of one leg must correspond to the inside of the bell and the curve of the other leg must exactly fit the outside. A stake is then driven in the center of the so-called bell pit, and a small quantity of wood is piled around it. A hut of brick is built around the wood, outside of which a puddling of clay mixed with hair is plastered on. The wooden compass before mentioned is pivoted on the top of the stake, and the leg which corresponds to the inside of the bell is swung around and around until the plaster core, as it is now called, is brought into perfect shape to fit the inside of the bell. This core is well smeared with grease, and a false clay bell, shaped by the outer leg of the compass, is fitted around its outside. If inscriptions are desired, they are moulded in wax on the outside of the clay bell. The clay bell is then greased as was done with the core. Fine clay is sifted on the grease, and then coarse clay laid on and troweled to the shape desired. This outside and last covering is called the mantle. A fire is now lighted in the center, as in a brick kiln, and is maintained until core, clay bell, and mantle are baked thoroughly into the semblance of pottery or tiling. During the firing process the grease between the core and clay bell, and between the clay bell and mantle is ab-

sorbed, which, together with the shrinking, makes the three pieces fit together rather loosely. The outside mantle is now lifted away and the false clay bell is lifted off or broken up. The mantle is let down again into its former position, inclosing a space between itself and the core, the exact shape of the proposed bell. In other words, two patterns have been made, one fitting the inside of the bell, the other fitting the outside. The molten metal is now poured in at the top, between the two patterns, where the head of the stake was before the fire was built. The metal is allowed to cool for several weeks. To get the bell out, it is only necessary to lift away the mantle and then lift the bell from the core. If the proportions are perfect, and the casting is without flaw, the bell will be in perfect tune. The maker tests his bell by tapping it just on the curve of the top, about one-fourth of the distance from the top, and again about the rim where the clapper strikes. If the bell be too thick in either of these three places, it may be filed slightly and brought into tune, but if, unfortunately, either of the three critical zones to be too thin, nothing can be done to remedy the defect. If the fault be too noticeable, the bell is worth nothing, except for metal to be melted and cast again. A maiden bell is one that is in tune without filing. Such a bell is prized highly.

The note of a bell depends upon its weight. The larger and heavier the bell, the deeper the note. A bell weighing 22½ tons sounds C of the bass clef and costs about $18,000. A bell sounding C an octave higher weighs nearly three tons and is worth about $2,400. The law of notes runs to the effect that vibrations are in inverse ratio to the cube roots of the weights.

Some of the great church and tower bells of the world are a twenty-five ton bell in Cologne Cathedral; Big Ben in Westminster Clock Tower, thirteen tons; Great Tom at Oxford, seven tons; Great Peter in York minster, ten tons; one at Rotterdam, seventeen tons; the great bell at Pekin, China, fifty-three tons. The largest bell in the world in actual use is at Moscow. It weighs eighty tons. The Great Bell of Moscow, reputed to be the greatest ever cast, was never hung. It now stands on a raised platform in the middle of the square. It is estimated to weigh one hundred ninety-eight tons. A bell in Kioto, Japan, is said to be still larger. It is twenty-four feet high and sixteen inches thick at the rim. The Japanese excel in casting sweet-toned bells.

The first bell rung in the New World was swung in a church built early in 1494 by Columbus on the island of San Domingo. This bell is of bronze, eight inches high and six and a half inches wide. The bells referred to by Longfellow in *Evangeline,*

> Distant and soft on her ear fell the chimes from the belfry of Christ Church,

are chimes which peal forth every Sunday morning from the steeple of old Christ Church, Philadelphia. These bells were brought from England, a present from Queen Anne. When the Quaker City was in danger of falling into the hands of the British, the precious bells were taken down and sunk in the Delaware by some patriotic members of the old church, who feared that if the enemy got possession of them they would be melted and cast into cannon balls. Afterward they were drawn up from their watery bed, and when the war came to a close were hung again in the old belfry.

Modern uses of bells are almost too numerous to mention. Electrical bells are rung by a hammer attracted and released by a temporary magnet. Gray's famous line,

> And drowsy tinklings lull the distant folds,

is a reminder of the custom of placing bells on the leaders of the flock. Bells are a help not only in finding the cattle, but they enable the other members of the flock to keep with their leaders. Bells also frighten away wild animals. Horses passing along the narrow mountain roads of Switzerland are furnished with bells to give notice of their approach so that their drivers may meet in a widened portion of the road. In many cities, sleigh bells are required to give notice of the otherwise noiseless approach of sleighs.

A series of bells of different weights and consequently of different notes constitutes a peal, the ringing of which is a well known practice. Eight bells form an octave for the ordinary peal.

See COPPER; ALLOY; LIBERTY BELL.

Bell, Alexander Graham (1847-1922), an American scientist distinguished as the inventor of the first successful telephone, was born in Edinborough, Scotland. He was educated in Edinborough and at London University. At the age of 23 he removed with his father, Alexander Melville Bell, to Canada. Alexander Melville was the originator of the system of visible speech, successfully used in teaching the deaf and dumb to speak. The son became greatly interested in his father's work and in 1872 was appointed Professor of Vocal Physiology at the Boston University, where he introduced his father's system.

In connection with his work in teaching the deaf in the University, the professor took up the study of vibrations of the air during utterances of speech, with a view to developing an apparatus that would enable the deaf to recognize the forms of vibrations characteristic of the various elements of speech. In the course of these experiments he constructed a membrane telephone which was the forerunner of the telephone of today. That was in 1874. The next few years were years of trial and struggle for the young college professor. On the same day on which Professor Bell filed his application for a patent for his telephone, another scientist, Elisha Gray, filed an application for a patent of a telephone. Bell's patent was granted in 1876. Then followed a protracted litigation over the priority of claim between Bell and Gray. The question was finally decided by the United States Supreme Court in favor of Bell. Following this decision, the use of the telephone spread very rapidly. The first public experiment of the telephone was made in Philadelphia in 1876 and it was here that it received official recognition. See TELEPHONE.

Notwithstanding the demand which the telephone interests made upon Professor Bell's time he never lost his interest in teaching the deaf and dumb, and made a number of valuable researches, which were published. The Bell Telephone Company has been so managed that it has always held the monopoly of the telephone industry in the United States, and Dr. Bell's royalties were very large. This income enabled him to carry on numerous lines of scientific work and to assist various causes and institutions during the later years of his life. He was the inventor of the photophone, an instrument for conveying sounds by vibratory beams of light, and the graphophone, which was the forerunner of the phonograph.

In 1883 Dr. Bell was elected a member of the National Academy of Sciences. He received the Volta prize from the French government in 1881 and founded the Volta Bureau in the United States. He was a member of the National Geographic Society, and at one time president of the organization. He was also a regent of the Smithsonian Institute. In 1913 Dartmouth College conferred upon him the degree of LL.D.

Bell, Currer, a pseudonym of Charlotte Brontë.

Bell, John (1797-1869), an American statesman. He was born near Nashville, Tennessee, went to school in that city, and was admitted to the bar when only nineteen. A year later he was elected to the state senate and in 1827 was sent by the Whig party to Congress. He was elected to the important post of speaker of the House in 1832. President Harrison chose him as secretary of war in 1841, and later he served ten years in the national Senate. The "Constitutional Union" party nominated him for the presidency, and he won the votes of Virginia, Kentucky, and his own state. When Tennessee was later hesitating on the brink of secession he issued an address urging upon her part armed neutrality, but after her secession he supported the policy of the South.

Belladonna (Italian, beautiful lady). SEE NIGHTSHADE.

Bellamy, Edward (1850-1898), an American journalist and novelist. He was born in Massachusetts. He was educated in Germany and, on his return to this country, was admitted to the bar. *Looking*

Backward, his most noted work, is of a socialistic character. It was published in 1888. The story gives an imaginary picture of social and industrial conditions in the year 2000. The book led to the formation of "Nationalist" clubs, in which work Mr. Bellamy was a leader.

Belleau Wood. See WAR, THE GREAT.

Belle Jardinere, La, bel zhär-de-nyar, a celebrated painting of the Holy Family by Raphael. It represents the Madonna seated in the midst of a beautiful garden. The Child Jesus and the little St. John are leaning against her knees. The painting is one of the treasures of the Louvre gallery, and is regarded as one of the most beautiful of the many pictures which have the Holy Family for a subject. The name means "the pretty gardener." See RAPHAEL; THE LOUVRE.

Bellerophon, běl-lĕr′o-fŏn, a legendary hero of Greece. Iobartes, king of Lycia, was greatly troubled by a terrible monster, the Chimaera, which wrought havoc throughout his kingdom. While Iobartes was looking for a hero to destroy the Chimaera, Bellerophon appeared. He brought letters from the king's son-in-law, recommending him as a brave and unconquerable warrior, but closing with a request that the king put Bellerophon to death. Iobartes, wishing to please his son-in-law, but hesitating to violate the laws of hospitality, decided to send Bellerophon to slay the Chimaera. Some good would thus be accomplished, for if the warrior failed to kill the Chimaera, the Chimaera would certainly kill the warrior. Bellerophon was aided by the gods. Minerva gave him a golden bridle and guided the beautiful, winged steed, Pegasus, to his hand. Mounted on Pegasus, Bellerophon easily overcame the Chimaera. He performed many other valiant deeds. King Iobartes, seeing that his guest was a favorite of the gods, gave him his daughter in marriage and made him his successor to the throne. Bellerophon was made arrogant by his good fortune. Mounting his winged steed one day, he attempted to fly to heaven. Zeus, angered at such presumption, sent a gadfly to sting Pegasus, and the horse threw his rider. Lamed and blinded, Bellerophon wandered lonely for a time, and then died. The expression, "Bellerophontic letters," is used to designate communications which are designed to be in some way detrimental to the bearer. See PEGASUS; CHIMAERA.

> He whose blind thought futurity denies,
> Unconscious bears, Bellerophon, like thee
> His own indictment; he condemns himself.
> Who reads his bosom reads immortal life,
> Or nature there, imposing on her sons,
> Has written fables; man was made a lie.
> —Young.

Belle Isle, Strait of, the northerly of the two channels by which the Gulf of St. Lawrence is connected with the Atlantic. It is 80 miles long, and from 10 to 15 miles wide, and provides the shortest route from the St. Lawrence to Europe. Unfortunately, it is closed to navigation during more than half the year, and even in summer ships are often endangered by floating ice. The "Arctic Stream" passes through this Strait. It takes its name from the imposing granite island, 700 feet high, at its Atlantic end. A lighthouse and a wireless station are maintained by the Dominion Government.

Belleville, Ill., a manufacturing city, 14 miles east of St. Louis. It is the county seat of St. Clair Co. Here are located St. Peter's Cathedral, St. Elizabeth Hospital, St. John's Orphan Asylum, and a convent. It is the seat of a Roman Catholic bishop. Chief among its manufactures are stoves, brass ware, nails and tacks. Population, 1920, 24,741.

Bellflower (Latin *campanula,* a little bell), a genus of some three hundred species. Our common species has long, narrow leaves and a slender stem about knee high carrying a half dozen delicate, swinging, bright blue bells. It is the true "bluebell" of Scotland, the identical "harebell" of Scott's *Lady of the Lake:*

> E'en the slight harebell raised its head
> Elastic from her fairy tread.

There are other species. The marsh bellflower is found amid wiregrass in wet, boggy places. The stem is weak and three-sided; the angles are roughened backward. The bells are nearly white. Still another species is found in the woods of Virginia and southward. The tall bell-

flower is an upright annual, as tall as a man. It grows like a weed in rich soil from the Great Lakes to Georgia and Arkansas. It bears a spike of sessile, blue flowers. The blossoms are rotate instead of bellshaped; the leaves are broad; the stock coarse. The plant lacks the unsurpassed delicacy of the harebell.

Bellingham, Wash., 97 miles north of Seattle, is the county seat of Whatcom Co. It is in the center of an immense lumber, fishing and cement manufacturing district. Here is located the largest salmon canning factory in the world, and one of the largest cement manufacturing plants, the model plant on this continent. The only government bulb propagating farm is located here. The city has a normal school, 2 high and 11 graded schools, 2 business colleges and 2 public libraries. Population, in 1920, 25,570.

Bell-the-Cat, a sobriquet of Archibald Douglas, fifth earl of Angus. See DOUGLAS, ARCHIBALD.

Beloit, Wis., a prosperous manufacturing town, attractively situated on the Rock River, 90 miles from Chicago. It is served by the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern railways. The city is built on both sides of the river, its area being less than 5 square miles. Electric lines connect it with adjacent towns. There are many manufacturing establishments here where various products are made. It is the seat of Beloit College, a high grade institution under the auspices of the Congregational Church. In 1923 the faculty numbered 57 and the enrollment was 650. Population, 1920, 21,284.

Beloved Disciple, The, a name given to the Apostle John. In the Gospel of John the apostle speaks of himself as "the disciple whom Jesus loved."

Belshazzar, bel-shăz′zar, a Babylonian prince mentioned in the Book of Daniel, Chapter v. He died 538 B. C. According to the scriptural account, Belshazzar was the son of Nebuchadnezzar and the last of the Chaldean dynasty at Babylon. Ancient historians name Nabonidus as the last king, and do not mention Belshazzar as a descendant of Nebuchadnezzar. The cuneiform inscriptions discovered at Babylon have made clear this discrepancy. Nabonidus, the last Chaldean king, fled from Babylon after the defeat of his forces and while the city was in a state of siege. He left his son Belshazzar, whom he had previously associated with himself on the throne, in charge of Babylon. The story told by Daniel is that Belshazzar made a great feast to a thousand of his lords. While they were merry with wine, the fingers of a man's hand appeared between the great lamp and the wall, and traced words of unknown meaning on the plaster. The king was so terrified by the apparition that he lost countenance and his knees smote together. He called for his astrologers, but none was able to explain the mystery until young Daniel, a Jewish captive, boldly interpreted the writing as a warning that the Babylonian kingdom was at an end. That same night Belshazzar was slain and the Medes took possession of his kingdom. The "handwriting on the wall" has been a favorite subject with both painters and poets. Byron has written two poems on Belshazzar and his vision. *Belshazzar,* by Procter, pseudonym Barry Cornwall, is the best known poem on the subject.

Beltane, bel′tan, an ancient festival observed by the Druids on the first day of May. The origin of the name is unknown, but it is supposed to have been formed from two words—Beal, the chief deity of the Druids, and a word meaning fire. At Beltane, a great fire was kindled on some elevated spot in honor of the sun, whose returning warmth after the desolation of winter was thus celebrated. It was the custom to extinguish all fires in houses, and to relight them from the embers of the Beltane. The other great festival of Druidical worship was Samhin, meaning "fire of peace," held on Hallow-eve. At this time, the judicial functions of the order were discharged. Public bonfires were also a part of the celebration. Hallow-eve is still called Samhin in some places in Scotland, and the name Beltane is used to designate Mayday, or sometimes Whitsunday.

Ours is no sapling, chance sown by the fountain,
Blooming at Beltane in winter to fade.
—Scott.

Ben, a Gaelic word meaning mountain. Ben-Ledi, mentioned by Scott in his *Lady of the Lake,* means the same as Mount Ledi. There are a number of Bens in the Scottish Highlands. Ben-Lawers on Loch Tay is 3,984 feet in height. Ben-More in Perthshire is 3,083 feet in height. Scott speaks of Ben-An. Ben-Nevis in Inverness-shire is 4,406 feet high. It is the highest elevation in Great Britain. Its summit commands a magnificent view of the north of Scotland from sea to sea.

Ben-Lomond, on the eastern coast of Loch Lomond, is the most celebrated mountain in Scotland. It rises to an elevation of 3,192 feet above the sea level. Its summit, four miles from the boat landing at Rowardennan, commands a panoramic view of southern Scotland. Its southeastern side is a sheer precipice 3,000 feet in height. The slopes of Ben-Lomond present a great variety of vegetation and have long been a botanical collecting ground for the students of the universities of Glasgow and Edinburgh.

Benar'es, a city of India. It is situated in the eastern part of old Hindustan on the north bank of the Ganges, about 400 miles northwest from Calcutta and the sea. Seen from the Ganges, Benares occupies a vast amphitheater of hills. The city is a mass of hovels, narrow streets, palaces, mosques, minarets, and domes. The entire river frontage is faced with stone. Expensive river-stairs of freestone lead up from the water's edge to pagodas and splendid temples.

Benares is the most sacred city of the Hindus. There are over a thousand temples. Wealthy Hindus from all over the Indian Empire still maintain town residences at Benares. The Mohammedan wants to see Mecca that his salvation may be secure. The Hindu desires to die at Benares that he may enter at once upon a life of happiness. A multitude of persons press down the ghats, for so the landings are called, to bathe in the sacred Ganges and to carry away the sacred water for the ablutions of the afflicted elsewhere. A horde of beggars with sores beyond description solicit alms from their more fortunate countrymen or beset the stranger with importunity.

Benares is the center of a productive district. Sugar and indigo are important products. There are local manufactures of brass work, shawls, silk goods, embroidered cloth, and filagree work.

The population in 1921 was 199,493.

Ben Bolt, a song written by Thomas Dunn English in 1842. The poem was written at the request of N. P. Willis. Set to the music of an old German air by Nelson Kneass, it became popular both in England and America. It had, however, been partially forgotten when its effective use in Du Maurier's *Trilby* called it again into favor.

Oh! don't you remember sweet Alice, Ben Bolt,
Sweet Alice, whose hair was so brown,
Who wept with delight when you gave her a smile,
And trembled with fear at your frown?
In the old churchyard, in the valley, Ben Bolt,
In a corner obscure and alone;
They have fitted a slab of the granite so gray,
And sweet Alice lies under the stone.

Benedick, in Shakespeare's comedy, *Much Ado about Nothing,* a young gentleman of Padua. He ridicules love and marriage, but, after a "courtship which is a contest of wit and raillery," he marries Beatrice. The name Benedick, spelled also Benedict, comes from the Latin and signifies a happy man. It was sometimes applied in sport to the monks of the order of St. Benedict, noted for their ascetic habits, and who were, of course, vowed to celibacy. Shakespeare may have had this jest in mind when he gave the name to the lover of Beatrice. It is Shakespeare's Benedick, and not the jest, that is to be remembered when we hear a newly wedded man called a "benedick."

When I said I would die a bachelor, I did not think I should live till I were married.—*Much Ado About Nothing.*

Benedict XV (1854-1922), successor to Pope Pius X in September, 1914. Giacomo della Chiesa was born in Pegli near Genoa of noble family his father being Marchese della Chiesa. After the usual preliminary education he was ordained to the priesthood in 1878. He advanced by degrees till in 1907 he became Archbishop of Bologna, and in May, 1914, car-

dinal. Previous to the conclave of that year his name was little mentioned for the papal chair. His choice resulted from the decision to select a compromise candidate rather than prolong to the point of bitterness a contest between the supporters of other rival candidates. His election has generally been regarded as a happy one. Although coming to the chair at a most critical time his experience as secretary to the late Cardinal Rampolla, a skilled diplomat. should fit him admirably to meet the situation. His first public utterance was an exhortation to all Roman Catholics to work and pray for peace.

Benedict, Saint (480-543), an Italian monk. He was a native of Norcia or Nursia, an Italian town up in the mountains, about seventy miles northeast of Rome. He was sent to Rome to be educated, but fled the Eternal City, so the chronicle runs, to escape the vice and violence that prevailed. He betook himself to a wild defile where he found seclusion and shelter. The details of his life, his growing fame for piety, attempts on his life, and the founding of cloisters may be passed over. In 1520 he located at Monte Cassino, about forty-five miles northwest of Naples. Here he established an abbey considered the earliest in the western world. The building, which must have sheltered thousands of inmates, is a huge, square, three-story affair. It still stands and is used as a seminary.

Each Benedictine took three vows: of poverty, of chastity, and of obedience. Benedict cast aside the system of bodily infliction,—of scourging and starving in vogue in eastern lands. He divided the twenty-four hours into reasonable periods for eating, sleeping, devotion, manual labor, and intellectual improvement. Thousands of adherents flocked to Monte Cassino. Band after band migrated to found establishments of like nature.

The Benedictines were the earliest order of western monks. Their devotion to scholarship, as demanded by the rule of St. Benedict, resulted in the preservation of precious literature through centuries of burning, plundering, and wanton destruction—centuries when monasteries were about the only buildings treated with any show of respect; for the Benedictines not only made collections of manuscripts, but they worked diligently copying manuscripts that learning might be multiplied abroad in the land. A library, with a desk for copying manuscripts, was a prominent part of a Benedictine monastery. At its height, the great brotherhood of St. Benedict included, it is thought, no less than 40,000 monasteries. Venerable Bede, Alcuin, and St. Augustine, the first archbishop of Canterbury, were Benedictines. The reader should not fail to get the idea that the Benedicts were a "missionary, civilizing, educational body."

Some notion of the spirit which was inculcated may be had from the following extracts from the *Rule of St. Benedict,* generally followed in the monasteries of the West:

> Laziness is the enemy of the soul, and consequently the brothers should, at certain times, occupy themselves in manual labor; at others, in holy reading. . . . If the poverty of the place, necessity, or the harvest keep them constantly employed, let them not mind that, for they are truly monks if they live by manual labor, as our brothers the apostles did; but let every thing be done with moderation, for the sake of the weak. . . . During Lent all shall receive books from the library, which they shall read one after another, all through. . . . On Sunday let all be occupied in reading, except those who are selected for various functions. If any one be negligent or lazy, so that he wishes neither to meditate nor read, let some labor be enjoined upon him, so that he may not remain doing nothing. . . . If, by chance, anything difficult or impossible be imposed upon a brother, . . . let him explain fitly and patiently to his superior the reason of the impossibility, not inflamed with pride, not resisting, not contradicting. If, after his observation, the prior persists in his opinion and his command, let the disciple know that it ought to be so, and confiding in the aid of God, let him obey. . . . Let no person dare to give or receive without the order of the abbot, nor have anything of his own peculiar property, not a book, nor tablets, nor a pen, nor anything whatsoever. Love the Lord thy God with the whole heart, whole soul, whole strength, and thy neighbor as thyself. Rencunce luxuries. Relieve the poor. Clothe the naked. Do no injuries, and bear them patiently. When you see anything good in yourself, attribute it to God and not to yourself.

The Benedictines have numerous monasteries in western Europe, including eight abbeys in England. In the United States, there are about 1,000 members of the order

under the rule of thirteen abbots. They maintain sixteen colleges.

Benedict is derived from the Latin *benedictus,* well spoken, or blessed. There have been fourteen popes by the name of Benedict.

Benefit of Clergy, in law, the exemption of clergymen from trial by the courts of the people. During the Middle Ages the church had a complete system of courts. Trials were conducted by or under authority of archdeacon, bishop, archbishop, and pope. Appeals might be carried on up to a church council. Each cathedral had its church court and an army of officers. Cases involving marriage, inheritance and usury might be brought before these courts; but especially cases of church discipline and, what is to the point, charges against the clergy, clerks, friars, and all other persons connected in a clerical capacity with the service of the church. These courts did not claim the power of life and death. They were milder than the popular courts. Penance, fines, and degrading from rank were imposed rather than stripes, the pillory, or imprisonment. As a natural consequence, priests brought up before the ordinary courts claimed "benefit of clergy" and were turned over to the court of the church. The existence of church courts was not without a parallel in the courts of certain guilds.

The system was not without its good side, but abuses grew up. Unworthy persons took holy orders for the protection afforded. The country swarmed with "holy clerks," who were engaged in other occupations. In a day when few learned to read, the ability to read a line or two even with the whispered connivance of a court officer, was sufficient at times, especially if supported by a few pounds, shillings, and pence, to prove title to benefit of clergy and set an arrant knave free. The benefit of clergy, in fact, was extended, as the principle worked out, to all persons who could read and write, and became a gross parody on justice,—a means whereby the law rested lightly on the well-to-do and grievously on the poor man.

In England the first recognition of the benefit of clergy appears in the statutes of Edward I, 1274. The privilege was modified in the reign of Henry VIII, and was repealed wholly in 1827, during the reign of George IV. Benefit of clergy was recognized by the early codes in the American colonies.

Benevolences, in English history, a system of forced loans exacted by royal authority without permission of Parliament. We hear of these "loans" in the reign of Edward IV. Prior to the Wars of the Roses Parliament made more progress in controlling the expenditures of king and ministers than was in all respects pleasing to the crown. Parliamentary grants of money, moreover, were conditioned on a redress of grievances too often to suit royal ideas of prerogative. The civil war between the houses of Lancaster and York gave the king an opportunity to fill the royal coffers with plunder and moneys from the sale of confiscated estates. Edward IV caused a bill of attainder to be passed stripping twelve great nobles and knights of their estates. An obsequious Parliament granted him the customs for life, and he made large sums of money by sending out trading vessels. Nevertheless, Edward desired more money, and he desired to raise it without reviving the proper and legal custom of calling Parliament together. He hit upon the plan of calling upon wealthy persons for "benevolences." A merchant invited to the royal presence, and received with great affability, could hardly refuse when told that his royal highness was in need of a "loan,"—a "benevolence"—of a certain sum. Green, the historian, says this exaction was resented bitterly, but resistance was fruitless.

An act passed during the reign of Richard III forbade the levying of benevolences, but, nevertheless, Wolsey and Henry VIII resumed the practice on a large scale. London merchants were asked to make up 20,000 pounds, and a commission was sent to every shire to exact loans. The amount collected was small in proportion to the demand made, but bad blood was stirred up. Even Henry and Wolsey were forced to give up.

James, the first of the Stuarts, the same during whose reign Jamestown and

Plymouth were settled, tried to govern without Parliament. His council sent out letters, oriental fashion, demanding loans from the larger landholders. The sheriffs, as the judges were called, did their best, but succeeded in raising not to exceed 60,000 pounds in three years.

Charles I, in no wise deterred by the failure of his predecessors, was determined to raise money without the consent of Parliament. He held that a king who had to bargain for money with which to carry on the government, was not a king at all. He was willing to beg, to borrow from individuals, or to force loans; but he and his courtiers set themselves against the authority of Parliament. Rather than come to time and correct abuses demanded by Parliament, they made a systematic demand for benevolences. Many counties refused outright; some sheriffs evaded the demand; others sent in grudging contributions. The king ordered a forced loan,—a general tax to be collected by the courts and tax gatherers. A tremendous outcry went up. Some clergymen preached the doctrine of "passive obedience," but the people were in an uproar. Peasants and squires alike were called before the tax gatherer and examined as to their ability to "aid the king." Troops were quartered in rebellious districts to awe the people into submission. Those who paid were hooted and jeered at by their neighbors. Those who did not pay were threatened and maltreated. Soldiers were quartered in their homes. Poor men who would not pay their little were torn from their families and hurried off to the army and the navy. Two hundred English gentlemen were confined in disgraceful prisons to subdue their obstinancy. Little revenue was raised. Charles was obliged finally to summon his Parliament.

The doctrine of benevolences died hard. It was a part of the larger doctrine of the divine right of kings. The exaction of benevolences did much to bring the courage of the English people to a sticking point. They taught kings that they had "necks like other people," and showed rulers that they had only such authority as the people might choose to give them. This abuse, so inconsistent with the maintenance of political liberty, was renounced formally by the king in the "Petition of Rights" (1628), and, though Charles afterward broke his plighted word in this matter, the great Civil War of 1642 marked its final disappearance.

An appeal was made to the nation to pay as a free gift the subsidies which the Parliament had refused to grant till their grievances were redressed. But the tide of public resistance was slowly rising. Refusals to give anything, "save by way of Parliament," came in from county after county. When the subsidy-men of Middlesex and Westminster were urged to comply, they answered with a tumultuous shout of "a Parliament! a Parliament! else no subsidies!" Kent stood out to a man. In Bucks the very justices neglected to ask for the "free gift." The freeholders of Cornwall only answered that, "if they had but two kine, they would sell one of them for supply to his Majesty—in a Parliamentary way." The failure of the voluntary gift forced Charles to an open defiance of the law. He met it by the levy of a forced loan. Commissioners were named to assess the amount which every landowner was bound to lend, and to examine on oath all who refused. Every means of persuasion, as of force, was resorted to. The pulpits of the Laudian clergy resounded with the cry of "passive obedience." Dr. Mainwaring preached before Charles himself, that the King needed no Parliamentary warrant for taxation, and that to resist his will was to incur eternal damnation. Poor men who refused to lend were pressed into the army or navy. Stubborn tradesmen were flung into prison. Buckingham himself undertook the task of overawing the nobles and the gentry. Charles met the opposition of the judges by instantly dismissing from his office the Chief Justice, Crew. But in the country at large resistance was universal. The northern counties in a mass set the Crown at defiance. The Lincolnshire farmers drove the Commissioners from the town. Shropshire, Devon, and Warwickshire "refused utterly." Eight peers, with Lord Essex and Lord Warwick at their head, declined to comply with the exaction as illegal. Two hundred country gentlemen, whose obstinacy had not been subdued by their transfer from prison to prison, were summoned before the Council; and John Hampden, as yet only a young Buckinghamshire squire, appeared at the board to begin that career of patriotism which has made his name dear to Englishmen. "I could be content to lend," he said, "but fear to draw on myself that curse in Magna Charta, which should be read twice a year against those who infringe it."—J. R. Green, *History of the English People.*

Bengal, a presidency of British India. The name is applied to territory having widely varying boundaries, and inhabited

by from 4,000,000 to 70,000,000 people according to the interpretation placed on the name. It is perhaps sufficient for the general reader to say that historical Bengal extends from the foothills of the Himalayas to the Bay of Bengal, and that it comprises the great plains of the Ganges and the Brahmaputra.

Ben Hur, bĕn hẽr, **a novel by Lew** Wallace, an American writer, published in 1880. The scene of the story is laid in the East in the time of Christ. Ben Hur, a young Jew, is the hero of the tale. He has many exciting adventures, and is finally converted to Christianity through the miracles of Jesus. The story has been successfully dramatized. The chariot race is the most dramatic scene in both play and story. See WALLACE, LEW.

And now, to make the turn, Messala began to draw in his left-hand steeds, an act which necessarily slackened their speed. His spirit was high; more than one altar was richer of his vows; the Roman genius was still president. On the three pillars only six hundred feet away were fame, increase of fortune, promotions, and a triumph ineffably sweetened by hate, all in store for him! That moment Malluch, in the gallery, saw Ben-Hur lean forward over his Arabs, and give them the reins. Out flew the many-folded lash in his hand; over the backs of the startled steeds it writhed and hissed, and hissed and writhed again and again; and though it fell not, there were both sting and menace in its quick report; and as the man passed thus from quiet to resistless action, his face suffused, his eyes gleaming, along the reins he seemed to flash his will; and instantly not one, but the four as one, answered with a leap that landed them along side the Roman's car. Messala, on the perilous edge of the goal, heard, but dared not look to see what the awakening portended. From the people he received no sign. Above the noises of the race there was but one voice, and that was Ben-Hur's. In the old Aramaic, as the sheik himself, he called to the Arabs.

"On, Atair! On, Rigel! What, Antares! dost thou linger now? Good horse—oho, Aldebaran! I hear them singing in the tents. I hear the children singing and the women—singing of the stars, of Atair, Antares, Rigel, Aldebaran, victory!—and the song will never end. Well done! Home tomorrow, under the black tent—home! On, Antares! The tribe is waiting for us, and the master is waiting! 'Tis done! 'Tis done! Ha, ha! We have overthrown the proud. The hand that smote us is in the dust. Ours the glory! Ha, ha!—steady! The work is done—soho! Rest!"

Benjamin, Judah Philip (1811-1884), an American statesman. He was born in the West Indies. His parents were English Jews, who, shortly after the birth of the child removed to North Carolina. As a young man Benjamin studied law and was admitted to the bar in New Orleans. He was elected United States Senator in 1852 and 1858, but when Louisiana seceded he withdrew from the Senate. When the Confederacy was organized he became attorney-general in Davis' cabinet, later was secretary of war and for the last three years of the war, Confederate secretary of state. He was a most able advocate of the Southern cause, and was widely known as the "Brains of the Confederacy." After the war he went to London where he practiced law successfully.

Bennett, Enoch Arnold, (1867——), an English novelist whose stories have won a wide popularity. He was born in Hanley, one of the Five Towns which his writings have made famous, and educated at the University of London. His novels are realistic and excel in depicting the characters of common people in everyday life. His best known works are *The Old Wives' Tale, Anna of the Five Towns, Clayhanger, Hilda Lessways, These Twain* and *The Matador of the Five Towns.* His essays, *The Human Machine* and *How to Live on Twenty-four Hours a Day,* have been widely read.

Bennett, James Gordon (1795-1872), an American journalist, founder and for thirty-seven years editor of the *New York Herald.* He was born in Scotland and educated at Aberdeen for the Catholic priesthood. Happening to read Franklin's *Autobiography* he became interested in America and emigrated to this country, a poor youth, in 1819. He tried teaching, writing, lecturing, and proof-reading, managing to eke out a meagre living. In 1835 he began to publish the *New York Herald,* a small one-cent paper. It was printed in a cellar where its proprietor and editor acted also as salesman. But Bennett had found his own work. His habits of industry and his wise judgment won wealth and success. He was the first to employ European correspondents, the first to make systematic sale of papers by news-

boys, the first to publish the stock lists and a daily money article. The first speech ever fully reported by telegraph was sent to the *Herald*. It was at Bennett's instigation that his son James Gordon Bennett, Jr., together with the *London Daily Telegraph,* supplied the funds for Stanley's expedition to Central Africa in search of Dr. Livingstone.

James Gordon Bennett, Jr., succeeded his father as editor and proprietor of the *New York Herald*.

Bennington, Vermont, a prosperous county seat with a population of 8,000. Its factories produce a large quantity of woolen and knit goods. There is a home for Vermont soldiers there; also a soldiers' monument. The town has good schools and other evidences of New England thrift and intelligence. The battle of Bennington was fought on August 16, 1777. General Burgoyne sent a column of 1,000 men eastward under Colonel Baum to collect supplies. They were met by the Green Mountain Boys under General Stark, who whipped them soundly, taking 600 British prisoners and 1,000 stand of arms. The American loss was 14 killed and 42 wounded. Two hundred and seven British fell before the rifles of the woodsmen. This victory gave new life to the American cause. The muskets and ammunition were of great service. A fine granite monument, 300 feet high, commemorates the victory. See VERMONT.

Bentham, bĕn′tam, **Jeremy** (1748-1832), a distinguished English writer. He was a native of London. Bentham may be associated in mind with Mill, Carlyle, Ruskin, and a host of other writers who insisted that English laws and English society did injustice to the great mass of the people. His house stood at the back end of an alley and faced inward on a little garden, "like an oasis in the desert." He desired privacy in order to busy himself with his studies, but his house was always open to his friends. It was quite a resort for thinking people. In 1823 he founded the *Westminster Review,* a periodical which had much influence on the legislation of Great Britain. A nephew, George Bentham, was a frequenter of the Kew Gardens and united with Sir Joseph Hooker in the preparation of *Genera Plantarum,* or genera of plants, the greatest descriptive botany ever written. See MILL.

Benton, Thomas Hart (1782-1858), a native of North Carolina. He was a member of the Tennessee legislature and served as a colonel in the War of 1812. He moved to Missouri to engage in newspaper work. He served that state as a United States Senator from 1821 to 1851. During his lifetime he published his *Thirty Years' View,* a historical retrospect of the period during which he sat in the Senate. While his rank was subordinate to that of Clay, Calhoun, and Webster, his career was open and honorable. He was an ardent supporter of Jackson in the famous nullification contest with Calhoun. His efforts in support of sound money won him the nickname of "Old Bullion." He favored the extension of slavery. He failed in an attempt to harmonize the views of the Northern Democracy with those of the Southern wing, and consequently lost prestige and fell out of politics. See FRÉMONT.

Benzene, or **Benzol,** a coal-tar product, obtained from the light oil or first distillate. It is important in chemistry as the first member of an important series of hydrocarbons, known as the aromatic series. It is a colorless liquid, has a pleasant odor, solidifies at about the freezing point, and burns with a bright flame. The main use is as a solvent for India-rubber, gutta percha, fat, and wax. Added to nitric acid, it gives nitrobenzene from which aniline is made. The distinction from the petroleum product, benzine, is to be noted.

Benzine, bĕn′zēn, a clear, colorless liquid obtained by the distillation of petroleum. It is closely allied to gasoline and naphtha, which see. It is used principally in the arts to dissolve fats, oils, resins, etc. In the household, benzine is useful for removing accidental daubs of paint, cleaning windows, marbleware, and the like.

Beowulf, bā′ō-wulf, an Anglo-Saxon epic poem. It is of unknown authorship. In all probability this oldest of English epics grew up out of ballads sung at feasts,

and was enlarged by successive singers or scôps, as they were called. Scholars find reason to believe that many of these songs or ballads were composed before the Angles and the Saxons entered England. The characters of the poem are evidently Danes, and the scenes are laid on the coast of Denmark and in southern Sweden. These songs were committed to manuscript probably in the seventh or eighth century,—it is certain that it was after the introduction of Christianity into England. Although the subject matter is heathen, the poem shows the influence of the Christian religion. This manuscript came into the possession of Sir Robert Cotton, and in 1707, seventy-five years after Sir Robert's death, was sold, with his large collection of original documents, to the British nation. This collection, known as the Cottonian library, was damaged by fire in 1731. It was transferred to the British Museum in 1753 on the founding of that institution; and there this single manuscript of Beowulf, stained with smoke and torn in many places, may still be seen. It is the earliest specimen of English literature, and is the first epic in the entire Germanic group of languages.

The Beowulf manuscript contains about 6,365 lines. These are what we would call half-lines; that is, each has two strongly marked accents. As we should print the poem now, it would consist of something over three thousand lines. It is written in Anglo-Saxon. One who has made no preparation by previous study would find the manuscript as difficult to read as is Greek or Latin to one unacquainted with these languages.

Beowulf is a Scandinavian hero, corresponding to the Greek Hercules. His name means "bear," and was given in compliment—because he was so great a warrior. He "rowed upon the sea, his naked sword held in hand." He slew sea monsters and sped to the aid of the old Danish king who sat afflicted "in his great mead hall, high and carved with pinnacles." Grendel, a mighty ogre, visited the mead-hall, killing and eating the warriors. Beowulf slew the monster after a terrible fight. He slew the "foul she-wolf of the abyss," Grendel's mother. "The sword was bloody, the man rejoiced in his deed; the beam shone, light stood within, even as from heaven shines mildly the lamp of the firmament." Beowulf, having relieved the Danes, ruled his own people for fifty years, and at last died as a result of a battle with the fire dragon; but he had slain the dragon, and had won for his people the treasure of gold and jewels hidden in the earth. His people burned his body on a great funeral pyre, and long mourned his loss. They

> Said he was mightiest of all the great world-kings,
> Mildest of rulers, most gentle in manner,
> Most kind to his liegemen, most eager for honor.

The poem is somber—dark with blood and swords, ravens of war, and hand to hand conflicts. There is alliteration, there is powerful description throughout the poem, but there are only six similes. Several translations of this poem into modern English have been made. Those in prose form, being more literal, seem more in the spirit of the original than do those which are more poetical.

The following quotation gives the words of Beowulf when he knew that he must die:

> "I have held this people fifty years; there was not any king of my neighbors, who dared to greet me with warriors, to oppress me with terror. . . . I held mine own well, I sought not treacherous malice, nor swore unjustly many oaths; on account of all this, I, sick with mortal wounds, may have joy. . . . Now do thou go immediately to behold the hoard under the hoary stone, my dear Wiglaf. . . . Now, I have purchased with my death a hoard of treasures; it will be yet of advantage at the need of the people. . . . I give thanks . . . that I might before my dying day obtain such for my peoples . . . longer may I not here be."

See BRUT; ANGLO-SAXON.

Ber'bers, an ancient people spread over northern Africa, particularly along the southern shore of the Mediterranean. They have a brown complexion, with dark, glossy hair, and are active and robust. Their language and features are akin to the Egyptians, rather than to the Arabs, by whom they have been, in a way, subjugated. They number five or six million and are found chiefly in Algiers, Morocco,

and the Sahara, their chief stronghold being the northern Sahara and the Atlas Mountains. The Berbers vary greatly. Many tribes preserve an independence akin to that of Bedouin Arabs. Others have settled down to agriculture, and have become an industrious, skillful race, quite able to manufacture their own guns, powder, and soap. They perform a large part of the agricultural work in Algiers, and are famous raisers of cattle and goats. The mountain tribes that give the Sultan of Morocco so much trouble by carrying off prisoners to be held for ransom are of this race. See ALGIERS.

Berenice's Locks, bĕr'e-nī-sēz lŏks, a group of seven stars forming the constellation *Coma Berenices*. Berenice was the wife of Ptolemy III. While her husband was on an expedition in Syria, Berenice vowed to sacrifice her beautiful hair in the temple of the wargod, should he be brought back to her in safety. Ptolemy returned and Berenice hung her hair in the temple. The hair disappeared, for it was the will of the gods that it should be hung in the skies to shine forever in token that they were pleased with a wife's devotion.

Berea College, a co-educational institution established at Berea, Ky., in 1855. It is situated on the edge of the Cumberland Mountains. The College has won wide distinction because of the discovery of the worth of the peoples in the southern mountains and its adaptation of methods and courses of study to their needs. The institution maintains a college of standard rank, and vocational, normal, high school and music departments. The students come from the mountain regions of Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Virginia, Alabama and West Virginia. There are about 150 members in the faculty and the enrollment exceeds 2,500.

Beresford, Lord Charles William de la Poer (1846-1919), British admiral, was born in County Waterford, Ireland. He entered the navy in 1859, and rose through all grades on his boundless enthusiasm and ability. As commander of H. M. S. *Condor,* he assisted at the bombardment of Alexandria in 1882, distinguishing himself and receiving special recognition for his cool daring. He commanded the *Safieh* in the Nile column of the Gordon Relief Expedition; and he was in command of the naval brigade at the battles of Abu Klea, Abu Kru and Metemmeh. He entered Parliament, and worked hard trying to secure a reorganization of the British naval program, but with no great success. He won the enmity of the Admiralty, but was made commander of the Channel fleet with the rank of admiral in 1907. In 1911, he retired from the navy. He was a strong advocate of the "open door" policy in China, speaking for it several times in the United States.

Beresford, William Carr, Viscount (1768-1854), a British military officer; a natural son of the first Marquis of Waterford; born in 1768. He entered the army, lost an eye at Nova Scotia, served at Toulon, and in Corsica, the West Indies, and Egypt.

In 1806 as Brigadier-General, he commanded the land force in the expedition of Buenos Ayres; and, in 1908, remodeled the Portuguese army, receiving in return the titles of Marshal of Portugal, Duke of Elvas, and Marquis of Santo Campo. As Marshal, at the head of 12,000 men he attacked the French in the north of that kingdom, crossed the river Douro, drove Loison's division to Amarante, and uniting with the force under Sir Arthur Wellesley, pursued it until it was quite disorganized. He received rich rewards from the British government, and in the administration of Wellington (1828-30), he was appointed to the office of master-general of the ordnance.

Bergamot, ber'ga-mŏt, a small tree with leaves and flowers like those of the bitter orange and with a fruit like the lemon. Bergamot grows chiefly in Italy. Oil of bergamot is obtained by grinding the rind of the fruit. It is of a limpid, greenish-yellow color, with a strong, pleasant, lemon odor, and a bitter taste. It is used in the manufacture of perfumery and as a flavor. The "wild bergamot" of the American botanist is a square-stemmed, aromatic herb of the mint family. The

blossoms are collected in a sort of head. The corollas are deeply two-lipped, about an inch in length. They vary in color from purple to bright crimson, lilac, and rose red.

Bergen, berg'en, a city on the western coast of Norway, 186 miles northwest of Christiania. It occupies an amphitheater at the head of a deep fiord twenty-five miles from the open sea, and is surrounded by rocky hills from 500 to 2,000 feet high. This city is sheltered. The climate is mild, with an annual rainfall of over seventy inches. Most of the houses are built of hewed logs, giving the town quite an alpine appearance. A market place, several churches, and a cathedral are worth seeing. A library of 50,000 volumes, a theater, a museum, and other institutions afford pleasure and instruction during the long winter months. The shipbuilders of the Clyde obtain timber from Bergen. Its merchants ship dried fish, herrings, tar, lumber, fish oil, and hides in exchange for flour, groceries, and clothing. At one time the Hanseatic League had an agency here and monopolized trade until expelled by the Norwegians in 1558. Their old building is still used as a warehouse. Bergen is the second city of Norway; it is an important seaport, with extensive shipping, and is well fortified. Imports and exports are heavy.

Two famous musicians were born here —Ole Bull and Edvard Grieg; it is also the birthplace of the poet Holberg. The last census gives Bergen a population of 90,733. See NORWAY.

Berger, Victor L. (1860-), a German-American Socialist leader and editor. He was born at Nieder Rebbuch, Austria-Hungary, and educated in a gymnasium and at the universities of Budapest and Vienna. He emigrated to America with his family, and settled in Milwaukee, Wisconsin, where he still resides. After working at various trades, Mr. Berger became a teacher in the public schools of Milwaukee. Because of his literary ability and his intense interest in the cause of Socialism, Mr. Berger arose in a few years to national prominence. He edited the *Milwaukee Daily Vorwaerts* from 1892 to 1896. Later, he edited *Wahrheit,* a German Socialist paper, and also the *Social Democratic Herald.* Finally, he was chosen editor-in-chief of the *Milwaukee Leader,* a Socialist Daily. Mr. Berger was a delegate to the People's Party Convention at St. Louis in 1896, and assisted in founding the Social Democratic party in the United States.

In 1910, he was elected alderman in Milwaukee, and in 1911 was elected to Congress, the first Socialist ever elected to the House of Representatives. In 1918, Mr. Berger and several other Socialists were indicted by a federal grand jury for their opposition to the draft and for otherwise opposing the government's policies in connection with the war against Germany. He and his associates were found guilty, and were sentenced to twenty years imprisonment, in the federal prison at Leavenworth, Kansas. The United States Supreme Court reversed the decisions of the lower courts against Mr. Berger, and he was again elected to Congress in 1922.

Bergerac, bârzh-rȧh', **S. Cyrano de** (1619-1655), a French dramatist and novelist, notorious also as a duelist. It is said that he fought more than a thousand duels and that most of them were in defense of his monstrous nose, to criticisms of which he was sensitive. His particular gift appears to have been in the writing of satire and burlesque romance. His writings were witty, vigorous, and full of invention, but lacking in finish. His works include *Le Pedant Ione, Agrippine, Comic Histories of the States and Empires of the Sun,* and *Comic Histories of the States and Empires of the Moon.* It is believed that Dean Swift and Edgar Allen Poe were both influenced in their imaginative writings by the work of Bergerac. It is not for any work of his own, however, that this author is best known in recent years. Edmund Rostand, a French playwright, has made Bergerac the subject of a drama, entitled *Cyrano de Bergerac,* in which the nose figures prominently. This play has been presented with marked success in France, England, and the United States, and has made familiar to all a name otherwise well-nigh forgotten.

Bergh, berg, **Henry** (1823 1885), an American philanthropist, born in New York City and educated at Columbia College. Mr. Bergh became widely known as the organizer of the *American Society for the Prevention of Cruelty to Animals* in 1865, and of which he was president during his lifetime. Through the influence of this society, laws have been enacted in nearly every state in the Union and in many foreign countries, providing for punishment by fine or imprisonment or both of those guilty of abusing domestic animals, and for the proper care of live stock when it is transported long distances.

Bergson, Henri Louis (1859 —), a French philosopher whose teaching has profoundly affected the thought of the twentieth century. Bergson believes intuition rather than intellect to be the trustworthy guide. He rejects all former philosophers, wholly or partially, because intellect holds too large a place in their theories. He regards time as a great reality, but does not divide into the past, the present and the future as we do. The past is no longer here; the present vanishes as we think of it; the future may never be. But time in the sense of pure duration is the only sure foundation upon which life rests.

Bergson was born and educated in Paris. In 1900 he was elected to the chair of philosophy in the College de France. In 1913 he gave a course of lectures at Columbia University, and in 1914 he was elected to the French Academy. He has published *Time and Free Will; Laughter* and *Matter and Memory.*

Bering Sea, that part of the northern Pacific Ocean lying between Alaska and Asia, north of the Aleutian Islands. It is about 1,500 miles in extent from east to west and 1,000 miles from north to south. During most of the year it is covered with a dense fog and in winter pack and floating ice is found in large quantities. The Pribilof Islands which contain the largest colony of fur seal in the world are in this sea. See SEAL.

Bering Sea Controversy, a dispute between the United States and Great Britain over the seal fisheries on Pribilof Islands. From 1867 to 1886, the United States had regulated by license the killing of seals on these islands. In 1886 and the years following, Americans and Canadians engaged in killing the seals in the open sea, more than three miles from shore. This was outside the jurisdiction of the United States government and to protect the seals the United States claimed entire jurisdiction over Bering Sea. This claim was disputed by Great Britain and the controversy was not satisfactorily settled, but in 1910 the United States prohibited seal hunting for a period of five years.

Bering Strait, the narrow shallow sea that separates Siberia from Alaska. It does not exceed 300 feet in depth and is only 36 miles wide at the narrowest point. It was discovered in 1728 by Vitus Bering, a Danish navigator in the employ of Russia. He also explored the coast of North America and the sea that bears his name. See ALASKA.

Berkeley, bĕrk'lē, a city of California, on the east shore of San Francisco Bay, eight miles from the city of San Francisco and adjoining Oakland on the north. The city is in a beautiful location on the heights overlooking the bay and the Golden Gate, it is served by two railroads, and has adequate electric interurban train service. A number of manufactories and planing mills are located along the water front. The University of California is located in Berkeley as is the State Agricultural College and the State Institution for the Deaf, Dumb and Blind. The population in 1920 was 56,036. See CALIFORNIA.

Berkeley, berk'lē, **George** (1685-1753), an English churchman, better known as Bishop Berkeley. He was a native of Kilcrin, Ireland. In philosophy he taught that the belief in the existence of everything outside of mind is false, that there is no world of matter, except as it exists in our imagination. "Matter, so far as it is thought to exist beyond the circle of consciousness, is inconceiveable, absurd, impossible." He became much interested in the conversion of the American Indians to Christianity, and ob-

tained permission to establish a college for them in the Bermuda Islands. He resided for a time at Newport, Rhode Island, and acquired an estate, which, with a number of books, he bestowed on Yale College. In literature he is remembered for various sayings. The phrase, "to cheer, but not inebriate," occurs in an essay in which he praises the mild and benign effects of tar water on the constitution. We conclude with a quotation taken from his essay *On the Prospect of Planting Arts and Learning in America:*

Westward the course of empire takes its way;
The first four acts already past,
A fifth shall close the drama with the day:
Time's noblest offspring is the last.

Berkeley, Sir William (1610-1677), a colonial governor of Virginia. He was a graduate of Oxford. He was sent out to Virginia in 1641, where, except during Cromwell's regime, he acted as governor until 1677. He appears to have been actively interested in the agricultural prospects of the colony. He instituted experiments in the raising of cotton, hemp, flax, silk, indigo, and rice, and encouraged the production of supplies for the English navy, including tar and masts. Governor Berkeley was aristocratic in his notions, and seemed to regard the common people as a sort of rabble who were not to be trusted with authority or education. He drove Quakers and Puritans out of the colony, and forbade the setting up of printing presses. He is credited with saying, "Thank God, there are no free schools nor printing press; and I hope we shall not have these hundred years; for learning has brought disobedience, and heresy, and sects into the world, and printing has divulged these, and libels against the best government." He established a profitable monopoly of trade with the Indians and was accused of self interest. When Indian outbreaks and massacres occurred, he took no steps to suppress the Indians, fearing, the people believed, to impair the profitable trade he had with them. When an insurrection under Nathaniel Bacon came to an end, he had so many people hanged that Charles II of England called him home with the remark, "The old fool has taken more lives in that naked country than I have taken for the murder of my father." See VIRGINIA; BACON.

Berlin, bēr-lĭn′, capital city of the former kingdom of Prussia and of Germany. As far as large neighbors are concerned, Berlin is 431 miles from Vienna, 674 miles from Paris, 746 miles from London, and 1,840 miles from Petrograd. Latitude 52° 30′ N.; longitude 13° 23′ E. It is situated in a sandy plain 120 feet above the level of the Baltic. The original city grew up on some islands in the river Spree, to which, no doubt, the early inhabitants resorted for protection,—the first requisite of a medieval city. The islands, connected by broad bridges, are still occupied by the older parts of the city. The more eastern district has the old churches, markets, and cathedral. The stock exchange, the town hall, and the great warehouses of the merchants are here.

The central part of the largest island was once the site of a castle. It is now a pleasure garden for the public, adorned by monuments and statues, and surrounded partly by the old Royal Palace and the Old Museum. These two buildings, and others built by way of annexes, contain a series of the most interesting and valuable collections in Europe. It would be beyond the limits of this article to enumerate even the historic rooms of the palace or the art chambers of the different galleries and museums. Halls of former feasting and brilliant balls; closets where matters of state were weighed; tables on which treaties were signed; the room in which Frederick the Great was born; his saddle and sword; cradles that have rocked royalty; laces and bridal dresses once worn by queens and empresses; swords and weapons; armor yet showing the dint of the battle-ax; the knife and fork of Napoleon captured at Waterloo; precious gems and regalia, make the people of whom one reads seem real. Then too, in the museums, there are cabinets of old coins, portfolios of engravings, collections of flint, bronze and iron implements from the lake dwellings, crude pottery, priceless Berlin and Dresden ware, bronze casts, and terracottas. There are long galleries

hung with oil paintings by the masters of every school, and halls of sculpture from the temples and palaces of Egypt, Assyria, Greece, and Rome,—altogether one of the great historical art collections of the world. One might wander amid these treasures for weeks or devote a lifetime to their study without wearying.

Starting from the Garden and Royal Palace, crossing the Spree by a bridge as wide as itself, a magnificent avenue, called Unter den Linden (under the lindens), leads westward through the modern city to the Brandenburg Gate. The avenue is 196 feet wide; from the river to the gate it is a mile in length. It takes its name from avenues of linden trees with which it is planted. Passing from the river toward the gate one leaves the palace of the crown prince, the Royal Opera House, and the present residence of the emperor on the left hand. The buildings of the University of Berlin lie on the right. This is the greatest university in the world,—13,000 students.

Near the east end of the avenue and in front of the erstwhile palace,—in front also of the university entrance over the way,—stands a bronze statue of Frederick the Great. He is represented on horseback with his coronation robes and his walking stick. The various sections of the pedestal contain suggestive scenes and spirited groups of the men of his day, with figures of Moderation, Justice, Wisdom, and Strength. The statue was designed by sculptor Rauch, and was completed in 1851. It is forty-four feet high and is considered the finest equestrian statue in the world.

After the close of the Franco-German war, Emperor William I was extraordinarily popular. In pleasant weather a crowd always used to gather along toward noon about the statue of Frederick in front of the palace. At half past twelve the regiment of which the emperor was theoretically a member came down Unter den Linden carrying their colors and preceded by the regiment band in full play. The grayheaded emperor, clad in his red military uniform appeared at the window of his office rooms, saluted the troops, and then went back to his work. The regiment passed on, the crowd dispersed.

The Brandenburg Gate to which reference has been made is an edifice 85 feet high and 205 in length. It was built in 1793 in imitation of the entrance to the Acropolis of Athens. It has five different passages separated by massive Doric columns. The middle passage is reserved for the royal carriages. The material is sandstone. The gate is surmounted by a copper quadriga, a figure of Victory in a chariot driving four horses. It was taken to Paris by Napoleon in 1807, but was restored in 1814. Formerly the heads of the horses pointed toward the outer world, but on their return, they were set up with their heads toward the city.

The Royal Library with the manuscript and first copies of Luther's Bible and a report of the Diet at Worms in the handwriting of Melanchthon; the arsenal with a complete collection of firearms, the oldest dating from the invention of gunpowder; the natural history museums of the university, including the collections brought home by Alexander Von Humboldt; the palaces occupied by Bismarck and Von Moltke; the industrial museum; and many other sights of the city have not been mentioned. A new stone parliament house has been erected. It is enriched by sculpture without and by interior fittings of oak, marble, steel, and bronze.

Outside of the gate there is a large city park with beautiful drives, wooded avenues and ponds, and one of the most complete zoölogical gardens in Europe. The Avenue of Victory is lined with thirty-two historical groups of statuary. Five minutes from the gate by street car at the extreme end of the gardens lies the suburb of Charlottenburg, noted for a marble mausoleum of Queen Louise and her husband. The recumbent figures of the royal pair have been executed in carrara marble by Rauch. The queen in particular is a piece of unsurpassed workmanship. Every fold of her robe and feature of her face is as perfect as a lily.

In population, Berlin is the third city in Europe. In 1919 the census gave 3,801,-

235 people. The Spree seems but a series of canals, but its commerce is said to equal that of the Rhine. Berlin is also a railroad center with an immense business in grain, flour, shoes, drugs, metal work, locomotives, wool, cloth, crockery, leather, and cattle and dairy products. The affairs of the city are well managed. Miles of asphalt and cobble streets are kept cleanly swept. Street railways and gas and waterworks are owned by the city. Sewage is collected by an immense system of underground drains, and conducted to a plain below the city, where it is utilized to convert a large sandy tract into thirty square miles of fertile vegetable gardens. These gardens are managed by the municipality.

Berlin is no longer a provincial capital. Though not so cosmopolitan as London and Paris, it is one of the world's great cities. The stir and bustle of government doings, the atmosphere of music and of art, and the great university draw travelers from all climes. German, of course, predominates, but English and French may be heard on every hand.

See GERMANY.

Berlin, Treaty of, chiefly responsible for map of Europe as it was in 1914. At the close of the Russo-Turkish War in 1878, the European powers were dissatisfied with the treaty of San Stefano since it gave too much power to Russia. At the instigation of Prince Bismarck a congress was held in Berlin, representatives being present from Germany, France, Italy, Austria, Russia, Turkey, and England. Eighteen of the twenty-nine articles of the treaty of San Stefano were eliminated or modified. Bulgaria proper was made a self-governing principality tributary to Turkey, while its southeastern portion known as Eastern Roumelia became a self-governing province. Roumania, Servia, and Montenegro received their independence. Russia acquired Bessarabia, which she had lost by the Crimean War and also the fortress of Kars and the port of Batum; Bosnia and Herzegovina were put under the rule of Austria; Cyprus became a possession of Great Britain; Greece acquired Thessaly and a portion of Epirus. Russia, as was to be expected, opposed measures of the treaty but to no avail. The Congress re-affirmed the principles declared by the former treaties of Paris and of London that the status of Turkey must be decided by the powers jointly.

Berliner, Emile (1851-), a German-American inventor, was born in Hanover, Germany. In 1870, he came to the United States, and in 1879 was made chief instrument inspector of the Bell Telephone Company. One of his most important inventions is the loose contact telephone transmitter, or microphone. It was he who invented the disc talking machine record, on which the needle runs in a groove of even depth but of varying directions, and is automatically propelled across the disc by running in the groove. The air cooled aeroplane engine, in which the cylinders revolve, is also one of Berliner's inventions. In 1907, he planned and was a member of the Washington Milk Conference, and since 1901 has been engaged in an educational campaign against the danger of using raw milk.

Berlioz, Hector (1803-1869), a French composer and the father of modern orchestration, was born at La Côte Saint André. Berlioz studied at the Paris Conservatory, and in 1830 won the Prix de Rome, which he had long coveted, for his *Sardanapalus*. Through his compositions of program music he established a new school of composers, whose aim it is to express ideas, moods, even definite events, with music. Berlioz wrote the overture to *King Lear;* the symphonies *Harold in Italy* and *Romeo and Juliet;* the opera *The Trojans;* and the well known hymn *Te Deum*. Berlioz so influenced the advance of orchestral technique, that the work of Wagner, Liszt and Strauss was builded on the foundation laid by him.

Bermudas, a group of 360 small islands, belonging to the British Empire. The group lies in the Atlantic, 580 miles east of North Carolina, and something less than 700 miles from New York. The islands are of coral formation. They lie in the pathway of the Gulf Stream. Twenty of the islands are inhabited. They are noted for their scenery and a mild climate. Numerous hotels are thronged with

winter visitors from the United States and Canada. About 12,000 acres are under cultivation. The season permits the raising of three crops a year, but the soil is productive and the efforts of the people are confined to raising onions, potatoes, and Bermuda lilies for the spring market of our North Atlantic cities. The islands are connected by cable with Halifax and Jamaica. Telegraph and telephone lines have been set up and a regular postal service is maintained. The islands are controlled by a governor appointed by the British crown, a council, and a local legislature of thirty-six members. The total population of the islands is about 18,000, two-thirds colored. The annual exports amount to one-half a million dollars a year. The imports are valued at about five times that sum. Americans are not permitted to acquire real estate.

Bernadotte, ber-nä-dŏt′, **Jean Baptiste Jules** (1764-1844), a distinguished French soldier. He was the son of a lawyer and entered the French army as a private in the royal marines. He rose to distinction in the army of the French Revolution, and became minister of war. He was one of Napoleon's most able commanders, distinguishing himself especially at the battle of Austerlitz. In 1810 the prospective heir of the Swedish throne died, leaving the reigning monarch without an heir. The Swedish legislators, so runs the chronicle, wisely chose Bernadotte, not only for his nobility of character, but for his military talents. They thought he would be an admirable man to manage their government and to lead their armies in case of war. They accordingly made him crown prince, or a sort of adopted son to their aged monarch, Charles XIII. As a matter of fact Napoleon imposed Bernadotte on the Swedes. He proved a wise prince,—by no means a puppet of France. In 1813 Bernadotte led the Swedish forces to join the troops of Germany in the great battle of Leipsic in which Napoleon was so signally defeated. In 1818 he ascended the throne of Sweden as Charles XIV. He died at Stockholm and was buried there, leaving an only son Oscar to inherit his throne. It is not often that one of untitled ancestry is called to sit on a European throne. Gustaf V, king since 1907, is a great-grandson of Bernadotte. See NAPOLEON; SWEDEN.

Bernard, ber-närd′, **Great Saint,** a pass of the Alps. It lies in the mountain road midway between the town of Martigni in the valley of the Rhone and Aosta in the Piedmont on the southern side of the mountains. It is the most celebrated of the passes by which travelers may go in passing from Germany to Italy. In May, 1800, Napoleon scaled the pass with a force of 30,000 men, dragging their cannon and supplies with them. Their descent upon Italy was a complete surprise, as the pass had been considered impassable for military forces. Other armies have followed the same route.

The famous Hospice of Saint Bernard is situated on the pass. It is the highest permanently inhabited spot in Europe, 8,120 feet above the sea. The Hospice was founded in 962 by the monk whose name it bears. It was intended to afford food and shelter to wayfarers, especially pilgrims on their way to Rome. There are two large, stone buildings, cared for by a dozen Augustinian monks and half as many servants. During the short summer twenty horses are employed in bringing wood and provisions on their backs from a valley twelve miles distant. The position of the Hospice is in winter the most dreary imaginable. This season lasts nine months. Travel is, of course, easiest in the summer time, when from three to six hundred people have been fed and afforded shelter in a single day and night. In winter the roads are blocked with snow and are exceedingly dangerous. The monks maintain a number of the well known St. Bernard dogs, animals of great intelligence and strength, and with a keen scent. The monks struggle through the snow with these dogs in search of benumbed travelers. They save many lives. The remains of those who are frozen to death are placed in a morgue near by, where they are wrapped in linen and laid away for the possible identification of friends. The climate is so cold,—ranging

from 25° below zero in winter to 68° above in midsummer,—that bodies keep for a long time. Unclaimed bodies are finally deposited in a rocky place where a large accumulation has been made. There is no earth near to cover them.

The monastery is supported by charity. Everyone who comes is fed and, so far as possible, given a bed for the night. No charge is made for entertainment. A box is placed for the reception of such coins as travelers may care to give.

See SIMPLON; CENIS; ST. GOTHARD.

Berne, the capital of Canton Berne and of the Swiss Confederacy. Elevation, 1,710 feet above the sea. The city is built on a peninsula of sandstone rock occupying a loop of the river Aar. The chief streets run east and west. The bear, the heraldic emblem of Canton Berne, is in evidence everywhere. Stone bears guard the gate by which one enters the town. Bruin in stone and bruin in wood is the everywhere recurring ornament of the public buildings and fountains. A long, narrow street leads eastward through the town, lined on either side with a continuous wall of shops and houses. The second stories project into the streets until they almost meet, forming a covered arcade on either side through which foot passengers take their way. At its eastern extremity, the street crosses the Aar on a stone bridge which brings one to the bear garden, where an assemblage of captive brown bears of all sizes and ages tumble about contentedly, walk erect, make their manners, and climb for the edification of spectators. A whole troop of wooden bears perform at the clock tower. As the time for striking the hour approaches, a wooden cock flaps its wings and crows; and wooden bears march gracefully around a seated figure of a bearded old man. The old man turns an hour glass in his hand and counts off the hour by raising his scepter and opening his mouth. The leader of the bears counts off the hour with nods of his head, while a stone figure in the tower above strikes on a bell with a hammer. The wooden cock concludes the performance by crowing. No child of Berne can be expected to proceed on an errand if it be near the time for the clock to strike.

A fine old Gothic cathedral contains a number of pieces of sculpture, stained windows, and carved work. The historical museum contains large cabinets of antiquities from the lake dwellings and the tombs of Switzerland, showing in detail the weapons and implements used by primitive man in the stone, in the bronze, and in the iron age. There are large collections of armor, spears, and other weapons, with the field altar taken by the Swiss from Charles the Bold of Burgundy, the time they trounced him at Grandson. A natural history museum possesses immense collections of minerals, including magnificent Swiss crystals and specimens of the smoky topaz, fossils, birds, eggs, mounted chamois and other Swiss animals, fishes, and insects.

When one has seen the curiosities of the museum and the bear garden, the streets themselves and the people are a never-ending source of interest. The stone paving of the old arcades is worn into deep furrows by the travel of centuries. Flights of steps rising into quaint old shops have been worn until they present mere polished slopes. The citizens of Berne are proud of their new government buildings and pleasure resorts and drives, but the visitor delights most in the old part of the town with its arcades, old-fashioned inns, and curio shops, where he is tempted to invest in crystals, gems, inlaid work, carved platters, canes, wooden bears, and carved chamois, not to mention ribbons and a thousand knick-knacks offered as souvenirs.

On a clear day the terraces of the city command a magnificent view of the Bernese overland. Even in midsummer the snow clad peaks, thirty or more, present a glorious spectacle.

The modern city has quite outgrown the old walls; manufactories of woolens, cottons, silks, machinery, and chocolate have become established, and a considerable trade is carried on with the surrounding cantons. The present population is about 104,626.

See SWITZERLAND.

Bernhardt, bern hart, SARAH (1844-1923), a noted actress, by many considered the greatest. Her parentage was Dutch-Jewish on her mother's side with a French officer as her father. Her birth record was lost in the flames of the French Commune, but the commonly accepted date has been October 22, 1844. She was born and spent her early life in Paris. Her first appearance on the stage was at the age of twelve in a miracle play at the convent school she was attending in Versailles. The following year she was placed in the Paris Conservatory, where she took second prize for tragedy. The stage folk at the Comedy Francaise took up a subscription which enabled her to remain at the Conservatory, and the following year she took second prize in comedy at the above named theater. She made her debut on August 11, 1862, in a minor part in Racine's *Iphigenia.* After five strenuous years of study and struggle she achieved a notable success as Cordelia in a translation into French of *King Lear,* followed by a series of triumphs in other tragedy roles. At the outbreak of the Franco-Prussian war she became a nurse and for more than a year served in a Paris theater, which through her efforts had been turned into a hospital. Continued successes in rapid sequence came to "La Divine Sarah" following the war.

In 1879 she received an ovation in London. She said, "The English people first made me believe in myself." Tours of Denmark and Russia brought further laurels. In 1882 she married a Greek actor, Damala, but was separated from him the following year. Prior to her marriage she had a son, Maurice, of publicly unknown paternity.

Bernhardt's repertoire was a growing one, including the Sardou plays, several of which, *Theodora, La Tosca* and *Cleopatra,* were written especially for her. Her American tours of 1886-7, 1888-9 and 1891-3, the latter extended to a trip around the world, yielded her a fortune. Upon her return to Paris in 1893 she opened the Theatre de la Renaissance, the scene of further tributes to her art, till in 1899 when she moved to the more commodious Theatre des Nationes, renamed Theatre Sarah Bernhardt, opening with *La Tosca.*

During her American tour in 1900 Bernhardt appeared with Coquelin in Rostand's *L'Aiglon.* In 1911 she again crossed the Atlantic and her devotees in this country had an opportunity of seeing her in many of her best known roles. Her 1913 visit to America was devoted to vaudeville engagements, where she presented one scene parts from her leading plays and a one-act play written by her son Maurice.

An accident from which blood poisoning developed made necessary the amputation of a leg in 1915, but this failed to terminate Bernhardt's career. Her participation in several moving picture productions gave her great pleasure and she is reported to have remarked after seeing her first screen appearance, "Now, I am immortal." Her final American tour came in 1916 when her visit to the principal cities was a continuous ovation.

The following is an eminent writer's estimate of her services to America:

Of French literature we knew nothing. She opened that great treasure-house to us. She made living realities of great dramatists and created an intellectual sympathy between France and America.

In addition to her main life work as an actress Bernhardt was no mean painter and sculptor. Two creditable plays are from her pen as well as a volume of memoirs. She achieved the distinction of membership in the French Legion of Honor. For sixty years she was an outstanding figure in her art. Her position as the first actress of her time is indisputable; not so much in characterization as in emotionalism lay her skill. She was a past master in stage-craft. Inspiration in the suggestion of unutterable emotion was supplemented by the highest technical efficiency. And her voice! James O'Donnell Bennett says, "As long as they live who have heard 'the voice of gold,' she will remain a Golden Memory."

Among her successes should be numbered *Fedora, Joan of Arc, Sappho* and the part of *Hamlet* in a French translation of the Shakespearean masterpiece.

Bernstorff, Count Johann Heinrich Von (1862-), a German diplomat, well known ambassador from Germany to the United States. Count Bernstorff, after serving in the German army, entered the diplomatic service, and held many important posts in European cities, and in 1908 became ambassador to the United States, holding the post until February, 1917. After his return to Germany the Kaiser appointed him ambassador to Turkey, and after the close of the war he returned to Germany. During the early sessions of the Peace Conference Bernstorff acted as head of the Foreign Office Bureau, collecting material to be presented to the Conference. He was later adviser at the peace negotiations. Through the influence of Bernstorff, several difficult questions were amicably settled.

Berseem, an Egyptian forage plant. It is known as the Egyptian clover. In Egypt it is valued because it grows readily in lands that are only partly reclaimed from the sea, and is not drowned out easily by overflow. It has been suggested as a forage crop to be raised in the southwest during the reclamation of strongly alkali lands, that is, before the alkali has been leached out of the soil by continued irrigation.

Bertillon System, a well known method of identifying criminals suggested by Dr. Alphonse Bertillon of Paris about 1879. As now understood the system includes three parts,—photographs, descriptions, and measurements. The descriptions include such items as the color of eyes, something a criminal is unable to change, hair, beard, and complexion; also deformities and any special marks, as moles, scars, and tattooing. Two photographs are taken usually, one of a profile, and one of the full face. Criminals not infrequently make a tremendous effort to distort their countenances, so as to prevent the photographs from being of value.

The measurements taken are of certain unchangeable bony lengths of the body. The parts measured are the length and width of the head; the cheek width; length of foot; the middle and little finger and the cubit, that is, from the elbow to the tip of the little finger; the height standing; the height seated; the reach of outstretched arms; right ear length; the median line in front from the fork or hollow below the larynx down; and, in the rear, the spinal column from the seventh vertebra to the base of the spine. The joints and flanges of the fingers are measured,—the flanges being the portions of the fingers between the joints.

Calipers provided with a graduated arch are used for measuring the head. In taking the length of the head the left point of the caliper is held at the root of the nose, and the right point is brought against the occipital bone in the back of the head; the thumb screw is then tightened and the measurement checked by passing the instrument again over the head. The width of the head over the cheeks is taken in the same way. The measurement of the foot is taken with a caliper rule similar to that used by a shoemaker. The prisoner is posed standing on his left foot, and the graduate stem is placed against the inside of the foot with the fixed arm in contact with the heel and the sliding arm then brought in tightly against the toe. In measuring the left middle and little finger the back of the caliper rule is used, two small projections being provided on the fixed and sliding arms. The finger is bent at right angles to the back of the hand and the measurement taken from the tip of the finger to the knuckle.

The detective bureau of Paris has over 100,000 of these Bertillon descriptions filed on cards of uniform size for immediate reference. If a man is placed under arrest in France, his measurements and description may be compared instantly with those of the central bureau. In this way criminals arrested for trivial offenses are not infrequently identified as wanted on serious charges elsewhere. Files are kept according to sizes, without any reference to the name given by the suspects. For instance, the measurements of men are kept in three classes according to the length of the head. These three divisions are subdivided according to width of head, and these again according to length of

middle fingers, which are subdivided still farther according to the length of foot, and these again according to length of forearm, little fingers, and color of eyes successively. If a man arrested in New York is suspected of escape from crime elsewhere his description, according to the Bertillon system, is sent to the capitals of Europe and to the large cities of this country. It is now well nigh impossible for a criminal to flee from his past record by a change of residence. His history follows him. Properly speaking, the measurements alone are due to Dr. Bertillon. A collection of photographs of prominent criminals has long been a feature of police headquarters, and is known as a "Rogues' Gallery."

Beryl, a well known precious stone. It is composed of silicon, glucinum, oxygen, and aluminum. Beryl crystals are six-sided. Usually they are pale green, but the color may be blue, yellow, white, or light red. Add a tinge of chromium and beryl becomes genuine emerald. Aquamarine is also a variety of beryl. Beryl crystals are found in granite. They vary in size from that of a kernel of wheat to stones beyond the lifting power of the strongest man. Two enormous but coarse specimens from the granite of Grafton, New Hampshire, weigh 2,900 and 5,000 pounds each. The finest crystals come from Brazil, Ceylon, Siberia, and China. The mountains of North Carolina yield beautiful crystals.

Berzelius, ber-zee′lĭ-us, **Jakob** (1779-1848), a noted Swedish chemist. He was the son of a schoolmaster. He became a student at Upsala, a professor of medicine at Stockholm, and professor of chemistry in the Medical Institute of Stockholm. Berzelius was a tireless worker. Among other contributions to science was a table giving the weight of 2,000 substances, elements and compounds, as compared with the weight of oxygen, which he took instead of hydrogen as a basis. Another contribution by Berzelius which will be appreciated by young students is a system of chemical notation. First he gave each element a symbol, usually the first letter or two of its Latin, or, occasionally, its Greek name. See table in article on CHEMISTRY. Hydrogen, for instance, he called H, and oxygen O. To indicate the number of atoms of an element entering into a compound it was only necessary to add a figure to the symbol, thus to denote water he wrote H_2O, indicating that it is made up of the two elements of hydrogen and oxygen in the proportion of two atoms of the former to one atom of the latter. Instead of a long statement of the composition of ordinary cane sugar, the chemist writes $C_{12}H_{22}O_{11}$, indicating that 12 atoms of carbon, 22 of hydrogen, and 11 of oxygen unite to form a molecule of cane sugar. Grape sugar he expresses as $C_6H_{12}O_6$, indicating a little less carbon in proportion to the other elements. These expressions by means of symbols and weights are not only brief and clear, but they are understood at once the world over, no matter what language the chemist may speak. Thus cane sugar is written $C_{12}H_{22}O_{11}$ in all textbooks, whether they are printed in the language used in the schools of France, England, Russia, or Japan. We also owe to Berzelius many other important discoveries and critical analyses of chemical problems. See CHEMISTRY.

Besant, bĕs′ant, **Mrs. Annie Wood** (1847-), an English theosophist and author. She was born in London and as a young woman was a devout ritualist. Soon after her marriage to Rev. Frank Besant she became a pronounced freethinker and was separated from her husband. About 1880 she became interested in theosophy, and was soon an ardent disciple of Madame Blavatsky. Since then she has devoted her life to spreading her views abroad by her writings, and by lecture tours. She founded in 1898 the Central Hindu College at Benares, India, later a girls' school at the same place, and in 1907 the University of India. She is the author of many works, among them *Death and After, Man and His Bodies, Karma Reincarnation, A Study in Consciousness, Through Storm to Peace, Four Great Religions.* See BLAVATSKY, MADAME; THEOSOPHY.

Besant', Sir Walter (1836-1901), a British novelist and critic. He was born at Portsmouth. He received his degree at Cambridge. He went out to the island of Mauritius as a professor of mathematics, but returned later to London and entered upon a literary career. In a literary partnership with James Rice, a number of novels were produced, including *The Seamy Side.* After the death of Mr. Rice, Besant wrote on alone. *All Sorts and Conditions of Men* stirred men's minds and gave a powerful impetus to settlement work in East London and indirectly to work of the sort on this side of the Atlantic. In calling attention to the need of reform in existing social and industrial conditions, Besant in his day did a work not unlike that of Charles Dickens. In 1895 he was knighted by Queen Victoria. Other stories of Besant's well known in America are: *All in a Garden Fair, The World Went Very Well Then, The Alabaster Box, Dorothy Foster,* and *Beyond the Dreams of Avarice.*

Beside the Bonnie Briar Bush, a collection of sketches by Dr. John Watson (Ian Maclaren), published in 1894. These stories, illustrative of Scottish life and character, are held together by no plot, but present the same characters repeatedly. The book made its author famous. It ranks with Barrie's *A Window in Thrums* and *Auld Licht Idylls.* This is the class of fiction that has earned the name, "Kailyard School." Barrie, Watson, and Crockett are its chief representatives. See WATSON, JOHN.

Bessemer, Sir Henry (1813-1898), an English inventor. He received his education chiefly in the type-foundry of his father, and early showed remarkable inventive ability. Among other inventions was a device for stamping deeds which was adopted by the English government, and to which he owed his knighthood. He discovered a method of making bronze powder which brought him commercial success. He also improved the methods of casting type. His greatest invention is that of the so-called Bessemer process of making steel. It consists essentially in blowing a blast of air through a molten mass of pig iron so as to clear it of carbon. A small quantity of carbon is then added, just enough to convert the mass into steel. This process so cheapened the cost of producing steel that it came into immediate favor for rails and general structural purposes. The great steel industries of the United States have been built up on the Bessemer patents. Bessemer, Alabama, and Bessemer, Michigan, were named for this inventor.

Bessey, Charles Edwin (1845-1915), an American botanist whose botanical text books are standard in some American schools. He was born at Marion, Ohio, and in 1869 was graduated from the Michigan Agricultural College. Mr. Bessey then studied under Professor Asa Gray at Harvard University. From 1870 to 1874, he was professor of botany at the Iowa Agricultural College. In 1884, he was appointed professor and in 1909 head dean of the University of Nebraska. Important among his published works are *The Geography of Iowa, Botany for High Schools and Colleges, Elementary Botany, The Essentials of Botany, Plant Migration Studies,* and *New Elementary Agriculture,* which has gone through many editions.

Betel, a pepper-like plant of the East Indies. The betel leaf and the betel nut are from entirely different plants. The betel nut is the nutlet or seed of the betel palm. The fruit is somewhat smaller than a hen's egg. The nuts are gathered before they are quite ripe. The betel nut gets its name from its use with the leaves of the betel. The natives pluck a green betel leaf, smear its surface with a quicklime made from shells, scrape in some fragments of a betel nut, and make a quid which is chewed like tobacco. Chewing causes a flow of saliva which, with the juice of the betel, blackens the teeth and stains the mouth and lips and gums to a repulsive brick red, almost intolerable. Some say betel chewing destroys the teeth at twenty-five, others that it preserves them, sweetens the breath, aids digestion, and gives color to the blood. One authority suggests that betel supplies a valuable tonic needed by people who are rice eaters, and who have no meat. The

betel habit is confined chiefly to the Malay race.

Bethlehem, a village of Palestine noted as the birthplace of King David and Christ the Lord. Thus it is written by the prophet, "And thou Bethlehem in the land of Juda art not the least among the princes of Juda: for out of thee shall come a Governor that shall rule my people Israel." The village is about five miles south of Jerusalem on the road to Egypt. It is a beautiful spot nestling at the foot of a hill covered with vines and olive trees. It commands an extensive view of Moab, the plain of the Jordan and wilderness of Engedi, whither David fled to escape Saul. Three convents are here; also a dignified church built over the grotto in which tradition declares Christ was born. An aqueduct brings an abundance of pure water from the hill. There are about 3,000 inhabitants who make a living chiefly by entertaining travelers and by manufacturing curios, mother-of-pearl boxes, rosaries, and crucifixes of olive wood to be sold to pilgrims and tourists who desire a souvenir from the birthplace of Christ. See JERUSALEM; PALESTINE.

Bethlehem, Pa., is a borough 56 miles north of Philadelphia, on the Lehigh River and Lehigh Canal. Across the river is South Bethlehem, the home of the Bethlehem Steel Company, whose plant is among the world's largest. This plant manufactures Bessemer steel, armor plate, government ordnance, and steel rails, drop forgings, iron and steel castings, projectiles, gas engines, hydraulic pumps, pig iron, steel shafting, etc. There are also hosiery and knitting mills, silk mills and cigar factories.

Bethlehem was founded by Moravians (United Brethren), shortly before Christmas, 1741. The time of the year suggested the name. The old European custom of trumpet playing from a tower on festival and funeral occasions, early established in the city by the Moravians, was the germ of the annual organized musical festivals held here. The first of these organized festivals was held in 1901, under the direction of J. Frederick Wolle, organist of the Moravian church. On this occasion, the *Christmas Oratorio* of Johann Bach was given in its entirety. The Bethlehem festivals were discontinued from the time of Mr. Wolle's removal to California in 1905 until his return in 1912, when they were re-established. Bethlehem is sometimes called the "American Oberammergau," owing to the religious character of the festivals. Population, in 1920, 50,358.

Betrothed, The, a novel by Sir Walter Scott, published in 1825, its heroine, Lady Eveline Berenger, being the betrothed of Sir Hugo De Lacy. She is in love, however, with Sir Hugo's nephew, Damian de Lacy. Many trials are endured by her, but in the end she and Damian are happily united.

Betsy Trotwood, in Dickens' *David Copperfield*, an eccentric old lady, David's great aunt. She is bitterly disappointed because David is a nephew instead of a niece, and for a long time has nothing to do with him. Finally he seeks her out and finds her kind-hearted in spite of her oddities. She proves the best of friends to the lonely boy.

Beveridge, Albert Jeremiah (1862-), an American statesman. He was a native of Ohio, but the family moved to Illinois after the Civil War and thence to Indiana. He graduated from De Pauw University in 1885, then studied law. Becoming well known by reason of his political speeches he was sent to the United States Senate by Indiana Republicans in 1899. He became prominent in the senate as a speaker. His books include *The Russian Advance, The Young Man and the World*, and the *Life of John Marshall,* one of the great American biographies.

Bible, the Scriptures. The word is of Greek origin, signifying a book or books. Both meanings are retained. At time of prayers, the head of the family says, "Hand me 'The Book.'" In the plural, the Bible is a library of the sacred literature of the Hebrews contained in sixty-six books. With the exception of a few chapters, the thirty-nine books of the Old Testament were written originally in Hebrew. The twenty-seven books of the New Testament were written wholly in Greek.

It is convenient to divide the books of

the Old Testament into five groups. The first five books are called the *Pentateuch* (pen-ta-to͝ok); Joshua, Judges, Ruth, Samuel, Kings, Chronicles, Ezra, Nehemiah, and Esther are historical; the book of Job, the Psalms, Proverbs, Ecclesiastes, and the Song of Solomon are poetical. In the original Hebrew they have the form of poems. Isaiah, Jeremiah, Ezekiel, and Daniel are the four greater prophets, the other writers from Hosea to Malachi are the twelve minor prophets.

The names of the different books of the Pentateuch define their character to some extent. *Genesis,* meaning origin, birth or beginning, recounts the creation. *Exodus* is the most interesting of the five from an historical point of view. The word means going forth or departure, and the book describes the departure of the Israelites from the land of Egypt. It also gives the Hebrew account of the origin of their peculiar laws and institutions. *Leviticus* is the book of the Levitical law. *Numbers* gives the results of a census of the Israelites made in the second year of the Exodus and of another made thirty-eight years later just before their entrance into the Land of Promise. *Deuteronomy,* a word meaning the second law, is a review of the law as given to the Israelites on Sinai. It is specially noteworthy for the beauty of its language.

Of the historical books, *Joshua, Judges, Samuel,* and *Kings* seem really to form one work recounting the fortunes of the Hebrews from the conquest of Canaan to the fall of Jerusalem. In these books are recorded the sayings of Samuel, Elijah and Elisha, the great prophet-statesmen of the Israelites. In *Judges* is found the oldest piece of writing in the Bible, the Song of Deborah. The book of *Ruth* is, in a sense, an appendix to the book of *Judges.* It also introduces the books of *Samuel,* which it immediately precedes. The authorship and date of its composition are unknown, but it belongs evidently to the period in which Hebrew literature was at its best. *Chronicles, Ezra,* and *Nehemiah* are believed to have been the work of one author. The book of *Esther* is a story which seems to have no connection with the other historical books.

Job is probably the most interesting of the poetical books. It is a dramatic poem, the greatest literary work of the Hebrews and one of the greatest of the world. Its authorship is unknown. The book of *Isaiah* is the greatest of the prophetical books. The first part of the book consists largely of threatenings of judgment against various nations, the last part prophesies the glorious future of Israel, when justice shall reign universally. The book is notable for the beauty and richness of its style, the sublimity of its thought and diction.

The New Testament is divided into the *Gospels* of Matthew, Mark, Luke, and John, the *Acts,* the *Epistles,* and the Revelation of St. John.

The country of the Hebrews lay in the great pathway between the Euphrates and the Nile, the cradles of ancient civilization. The route of travel bent northward to avoid the sands of Arabia. The Hebrews were buffeted back and forth by the two powers, and afterward came under the sway of the Greeks and Romans. It is not strange, therefore, that the phraseology of the Scriptures should be colored by a sojourn in many lands. From a literary point of view, however, the Scriptures of the Old Testament are related closely to the literature of Babylonia. The New Testament is decidedly Greek in its style and wording.

The translators have had much difficulty in finding English equivalents for the names of peoples, cities, coins, weights and measures, herbs, shrubs, trees, flowers, animals, birds, serpents, and insects. The names in the original are drawn from many sources and lands, and many have not been identified with certainty.

The question of just what writings should be accorded a place in the Bible is yet an open one. A compromise of long standing assigns a number of books a half way position in what is known as the Apocrypha. None of the original manuscripts have been preserved. It is impossible to state or even infer the number of copyings through which the texts

have passed before the oldest manuscripts now known were written. The oldest Hebrew copies date from the tenth century. The oldest Greek copies date from the fourth century. The first printed book was a part of the Old Testament in Latin. The first complete printed Bible is believed to have been issued in 1488. Luther's Bible was completed in 1534. The text of the Dutch Bible was adopted in 1637; the French Geneva Bible in 1535; the Danish Bible in 1550, and finally, after revision, in 1647; the Swedish in 1541. The standard English Bible of the Catholic church is known as the Douay Bible. It was published in France in 1609.

Caedmon paraphrased the Bible story in Anglo-Saxon about 670 A. D. King Alfred translated portions, but his Bible has been lost. The first considerable translation into English was accomplished by Wyclif 1380-2. Tyndale's Bible appeared in 1525. A score of other translations appeared from time to time. The ordinary text is that known as the King James Bible. It is known among Protestants as the Authorized Version. It was prepared in the reign of James I by a committee of forty-seven scholars and appeared in 1611. This is the Bible of English speaking peoples, the "Book" of family devotions, the source of literary allusions, the book that gave form to the English language and shape to Anglo-Saxon civilization.

A Revised Version was decided upon by the Church of England in 1870. Two companies of twenty-seven divines each were organized. A committee of Americans was invited to coöperate. The revision of the New Testament appeared in 1881; the Old Testament was ready in 1884. The changes from the King James Bible are numerous, but most of them are of minor character.

Bibles are published entire in over a hundred different languages. In 1907 partial copies were issued in 409 languages. There are about eighty Bible societies engaged in circulating the Scriptures. The British and Foreign Bible Society alone issues not far from 4,000,000 copies annually. The American Bible Society issues half as many. It was organized in 1816 and has circulated over 75,000,000 copies. This society sells the New Testament as low as six cents per copy, and the entire Bible for seventeen cents.

See TYNDALE; WYCLIF; DOUAY; SEPTUAGINT.

Bibliotheque Nationale, bĭb′lĭ-ō-thĕk′ nash′ō-nal′, the French National Library at Paris. See LIBRARY.

Bicycle, bī′sĭ-kl, a light, two-wheeled vehicle, propelled by the feet of the rider. The bicycle has been brought into practical use within the past fifty years, but the general notion is an old one. The hieroglyphics of the Egyptians represent a contrivance of the sort. Frescoes of ancient Pompeii represent figures on a riding stick mounted on two wheels. A stained glass window dated 1642 in the church of Stoke Pogis, the scene of Gray's *Elegy,* represents a rude bicycle. For two hundred years scientific journals have contained accounts of various devices, patents, and experiments, much as our present journals discuss the airship. In 1816 a Baron Drais of Mannheim invented a machine consisting of two wheels, one behind the other. The front wheel was axled in a fork which was swiveled to the frame and provided with a crossbar with which to guide the draisine, as it was called in honor of its inventor. The rider sat astride and propelled the machine by striking the ground with his feet. The inventor claimed that he could go uphill as fast as a man could walk, that he could travel from six to nine miles an hour on a level road, and that in going down hill he was able to rest his feet and travel at a speed equal to the gallop of a horse.

During the next fifty years, the journals were full of improvements and inventions. Out of curricle, dandy-horse, hobby-horse, accelerator, bicipede, bicircle, and velocipede, the name bicycle emerged about 1869.

The crank-driven, two-wheeled bicycle was first exhibited at the Paris Exposition in 1865, but the inventor did not realize the importance of his device sufficiently to patent it.

BICYCLE

The general use of the bicycle took root first in England where level, macadamized roads offered unusual advantages. English wheels were exhibited at the Centennial Exposition at Philadelphia, 1876, giving the American public an idea of their utility. Prior to this time a few machines had been made rather by way of curiosities. A little later Albert Pope visited England where he found about a hundred establishments making wheels. He gathered up the best ideas he could find and began the manufacture of Columbias at Hartford, Connecticut. It is still the leading American city in this industry. The earlier bicycles, as may be remembered, consisted of a large wheel and a small one. The rider was perched on a dangerously high seat, and was likely to take a header at any time. The safety type in which two wheels of the same size are employed was placed on the market in 1887.

The bicycle is not an American invention, yet American manufacturers now claim to produce the best and cheapest wheels in the market. American bicycles are sold abroad in competition with the best European makes. There were in 1920 fifty-one American establishments engaged in making bicycles, motorcycles, and parts, with 10,886 workers and capital of $35,362,150. The total value of the products in that year was $53,105,895. The demand for the motored type is increasing.

A number of points in the construction of the perfected safety are interesting. The invention of a padded, rigid saddle of hygienic pattern, mounted on springs that obviate the jar and jolt of old-fashioned "bone shakers" is one of the most important. The pneumatic tire is said to have originated in the use of rubber garden hose for the purpose. It not only prolongs the life of a machine, by lessening the strain which comes from jolting, but it enables the wheel to pick up the path better.

The greatest triumph of all is in the peculiar construction of the wheel. The bicycle wheel, like that of a cart, has a stiff, rigid rim, but here the similarity ends. The hub of the cart wheel, with its axle and load, is supported by the stiffness of the spoke or spokes that happen to be under the hub at the particular moment. The hub of the bicycle wheel, with the weight of the frame and rider, swings like a hammock at the center of the wheel. It is supported by the wire spokes that run to the upper part of the tire, not by the stiffness of the spokes beneath it. This device is known as the suspension wheel. The first patent on record is dated 1826, but the general notion is credited to an Italian, Leonardo Da Vinci. It precedes the discovery of America by a year or two.

The invention of the ball-bearing axle is due to an Englishman by the name of Bonn. The ends of the axle are slightly pointed or cone-shaped, and rest in funnel-shaped cavities to correspond. A circular row of steel balls, interposed between the surface of the axle and the funnel, roll as the axle rolls. The balls and parts are made of hardened steel which show very little wear. The ball-bearing feature comes nearer obviating friction than any other mechanical device known.

Frames have been made of various material, including papier-maché and hickory wood, but they are now made almost invariably of steel tubing. Ordinary tubing such as is used for water pipes is made of flat strips, with the edges rolled together and united by a seam. The tubing employed in making bicycles is much more expensive. It is drawn like glass tubing from a solid ingot of the finest steel, and has no seam. About twenty feet of tubing are required to make a frame. The various parts are joined together by the process called brazing. About 30,000,000 feet of this tubing are required in the United States annually. The tubing used has varied in weight considerably, oscillating between strength and lightness. The wheel of approved pattern may now be said to weigh about twenty-two pounds complete. The drop frame for the convenience of women was patented in 1886. The latest invention is the chainless gear. The first patent was granted in 1885, but practical patterns were not put on the market before 1897. The expense of their manufacture is nearly double that of or-

dinary single gearing. Other patents cover the coaster brake, pump, lamp, bicycle shoe, carrying basket, cyclometer, etc.

The bicycle is not only a great convenience, but has done much for the health, especially of those who are confined in cities. Parks and country roads are of little use to people who cannot afford to reach them. The mechanic with his wheel is able to reach his work with little expense of time and money. Wheels have done much to improve the condition of American roads.

MOTORCYCLE. The motorcycle is a bicycle driven by a small motor. On good roads a speed of 35 to 40 miles an hour is not uncommon and a much higher speed can be attained. Practically every large city in the United States has a motorcycle squad on the police force, and the motorcycle is in general use in the army.

See AUTOMOBILE.

Biela's Comet, named from its discoverer, Baron von Biela in 1826, and having a period of about six and three-fourths years. It was observed at several returns till in 1845-6 it was seen to be split in two, as was also the case in 1852. Since then it has not been seen, but in 1872 when calculation showed that the earth should cross its path, a shower of meteors was encountered, supposed to be fragments of the disintegrated comet. The same thing has occurred at later crossings, but has been less marked, as the matter of the lost comet further separates.

Biennial. See HERB.

Bienville, Jean Baptiste le Moyne, Sieur de (1680-1768), one of four brothers conspicuous in the settlement of the French province of Louisiana. With his brother Iberville, he left France in 1698, and in 1700 constructed a fort 54 miles from the mouth if the Mississippi River. In 1701, he succeeded his brother Souvolle as Governor of Louisiana. Bienville founded Mobile in the same year, making it the seat of government. He was dismissed from office in 1707; but in 1718 he was again made Governor. In this year he founded New Orleans, which became the seat of government in 1723. In 1726 he was again dismissed from office, but was reappointed in 1733, and made lieutenant general. Bienville was concerned for the welfare of the Colony throughout his active career; but when he was superseded in 1743, he returned to and remained in France.

Bigelow, Poultney (1855-), an American author and traveler, was born in New York City. He was graduated from Yale University in 1879 and from Columbia Law School in 1882, and subsequently studied in France and in Germany, where he was a fellow student of the late German Emperor. Mr. Bigelow was admitted to the bar in 1882, but he soon abandoned the legal profession for journalism and travel in China, Africa, the West Indies, Borneo, Australia, New Guinea, India and Russia. He was the first person to take a canoe through the Iron Gates of the Danube. He founded and was the first editor of *Outing,* the first American magazine of amateur outdoor sport. He has lectured at the leading American universities on modern history and colonial administration. Mr. Bigelow was correspondent for the London *Times* during the Spanish-American War. He is the author of *The German Emperor, The German Emperor and His Eastern Neighbors, Paddles and Politics Down the Danube, The Borderland of Czar and Kaiser, History of the German Struggle for Liberty, Children of the Nations,* and *Prussians and Pacifism.*

Big-endians, big-end'i-anz, in Swift's *Gulliver's Travels,* a religious sect in Lilliput. They are represented as regarding it a matter of duty to break egg-shells at the big end. The Little-endians broke eggs at the little end, and considered the Big-endians heretics. The Big-endians stood for the Catholic church, the Little-endians for the Protestants. See GULLIVER'S TRAVELS.

It is computed that eleven thousand persons have at several times suffered death, rather than submit to break their eggs at the smaller end. Many hundred large volumes have been published upon this controversy.—*A Voyage to Lilliput.*

Bighorn, a wild sheep of the Rocky Mountain region. It formerly ranged from Alaska to Mexico and into the Ozark Mountains, but is now restricted to the head waters of the Yellowstone and the region northward. There are several spe-

cies. The common bighorn is about forty inches high; its summer coat is a tawny yellow, which in winter changes to a grayish brown. The horns of the ram are very large, thick, and strong. They sweep backward in spirals, attaining a total length of from thirty-five to forty inches along the outer curve. The natural range of the bighorn is on elevated table lands or mountains, ranging above the timber line and below that of perpetual snow. Ceaseless persecution by the puma, the Indians, and, in later years, by the American hunter, with his long range rifle, have taught the bighorn to be exceedingly wary. It is a strong runner and a fearless jumper. It is considered one of the most desirable game animals and one which sportsmen find very hard to take.

Biglow Papers, The, the name given to two series of political poems with explanatory introductions by James Russell Lowell. The first series, 1846-1848, related chiefly to slavery and the Mexican War. The second series, 1862-1866, related to the Civil War and reconstruction. These papers appeared serially. They were written in the Yankee dialect and signed with the name of Hosea Biglow. When partisan feeling shall have passed, it will be found that the rustic sincerity of Hosea has won him a permanent place.

QUOTATIONS.

Laborin' man an' laborin' woman
Hev one glory an' one shame;
Ev'y thin' thet's done inhuman
Injers all on 'em the same.

This goin' ware glory waits ye haint one agreeable feetur.

Soft-heartedness, in times like these,
Shows sof'ness in the upper story.

Earth's biggest country's gut her soul,
An' risen up earth's greatest nation.

When Lowell conceived and carried out the idea of putting into the mouth of a homely New England farmer, Hosea Biglow, the shrewd rustic wisdom of the countryside, touching the vital questions of the day, local and national, with many comments in the way of introductions and letters by Hosea's parson friend, Wilbur, it was a stroke of genius. . . . Both the homely idyllic quality and the canny hardheadedness of the New England democratic type are deliciously conveyed in these papers by a man who really knew and loved them; and with a mastery of the metrical material such as has never been surpassed in the history of American literature. With this control of the poetic medium went a deep patriotism, a love alike of section and of country, lifting it all to a height of the moral earnestness and power such as to give the verse the dignity of a large vital theme. . . . The *Biglow Papers* swept the country; they were quoted and admired in England. Lowell became a power not only in literature but in American life.—Richard Burton.

Big Trees. See SEQUOIA.

Bile, in physiology, one of the digestive fluids. Bile is a thick, golden brown liquid of bitter taste and having an alkaline reaction. It is manufactured from the blood in the cells of the liver. The liver of an adult produces about a quart daily. The bile passes from the liver directly into the duodenum, or, if not needed for immediate use, it is stored in the gall sac, to be drawn upon later. Bile is an important digestive juice. It aids in breaking down fats, thereby assisting in their digestion. It separates the proteids so that they can be acted upon by the ferment, trypsin. It takes part in converting chyme into chyle. Bile is thought by many medical authorities to prevent in some degree, at least, the putrefaction of food. One of the functions of the liver is the destruction of certain poison-producing bacteria that flow into it with the blood. These the liver kills and sends on into the duodenum with the bile. If the process of bile production is interrupted, the destruction of the bacteria ceases. The bacterial poisons increase in the system and show their presence by coated tongue, by headaches, dullness, loss of appetite, and other conditions called in general biliousness. Yellow biliousness is due, therefore, to a lack of bile, not an excess. Certain drugs, well known to the medical profession, have the quality of increasing the supply of bile. They are prescribed for biliousness.

Bill, the name of documents of many kinds, and probably derived from the "bulla," or seal, applied to papers during the Middle Ages.

IN COMMERCE, the term applies to the itemized statement of goods sold, as well as to the itemized statement made when a stock of merchandise is invoiced.

IN BOOKKEEPING, drafts or bills of exchange in favor of a business house are

entered upon the books as *Bills Receivable*, while notes given or drafts accepted are entered as *Bills Payable*.

In Law. Here the term has an entirely different application, though it is applied to varying documents even here. A formal accusation, written, is termed a true bill, or bill of indictment. Then there are bills of cost, bills of particulars, and others.

In Legislation, the term has yet another application. The draft of a proposed law is called a bill. If the proposed law be enacted, the term no longer applies, what was known as the bill being thereafter called an "act."

Bill of Attainder, in English law, a bill introduced into Parliament convicting a person, without trial, of such crimes as treason or felony, and prescribing the penalty of death and the forfeiture of the accused's possessions. It was first employed in the English Parliament of 1459, but was abolished in England and its possessions in 1870. The death penalty was not always prescribed; but at best, the convicted could neither receive nor transmit by inheritance, could not testify, in a court, and could claim no legal redress for wrongs done him. The Constitution of the United States forbids the passage of bills of attainder by any state, and assures all accused persons of a fair and speedy trial.

Bill of Exchange, an order written by one person to another directing the latter to pay to a third person at a specified time a certain sum of money. The term "person" is not used to signify only an individual, in this case, but may mean a bank, or other institution. He who writes the bill is the "maker" or "drawer"; he who is directed to pay is the "drawee"; while he who receives the money is the "payee." A "domestic bill" is a bill drawn and payable in one country; a "foreign bill" is, as the name implies, one drawn in one state or country upon a person resident in another state or country.

No real difference exists between a bill of exchange and a draft, but common usage makes this distinction, that a bill of exchange signifies what is referred to above as a foreign bill, which has somewhat fallen into disuse since the term "draft" became common. Inherent in the term "bill of exchange" is the recognition of the different values of the monetary units of nations. See Exchange.

Billiards, bĭl′yerdz, a table game played by two or more persons. It is an ancient game, thought to antedate the Christian era. The game was introduced into America by the Spaniards, it is thought, about 1570. The players drive ivory balls about the table by striking them with the end of a wooden staff termed a cue. The table is about six feet by twelve. It must stand perfectly level, and be made of massive material so that it will not shake. The top is frequently made of slate. A raised rim or cushion packed with leather or rubber runs around the entire edge. The top of the table and cushion are covered with heavy green felt. Green is required as less deceptive to the eyesight, especially at night. Pool, a variation of billiards, is played on tables that have six holes, one at each corner and one at the middle of each side, provided with pockets of netting. The rules of the game are too technical for description here. Points are made by driving a ball in such a way that it glances from one to another, or, in pool, drives another into a pocket. Some games combine striking balls and driving them into pockets. Others consist of the one or the other. A successful billiard player must have a true eye and a quick, firm hand. The nicety with which a skillful billiardist can calculate angles is something wonderful. When detached from unworthy surroundings, the game of billiards is a delightful trial of skill, in itself as unobjectionable as lawn croquet.

Billings, Mont., on the Yellowstone River, 238 miles east of Helena, is the county seat of Yellowstone Co. It is situated in an extensive stock raising district, and the annual shipments of live-stock and wool are enormous. It is one of the largest inland wool markets in the United States. There are marble, limestone, and coal deposits in the vicinity. The city is very modern, having a fine school system and a public library. Population in 1920, 15,100.

Billings, Josh. See SHAW, HENRY W.

Billingsgate, the London wholesale fishmarket. Billingsgate is situated on the Thames, a little below London Bridge. In 1558 the wharf was declared a landing place for provisions. It was made a special fishmarket in 1699. All fish is free to land without duty if taken by British subjects and brought in British ships. Retail dealers and fish peddlers of every degree throng the stalls of the fishmarket to purchase a supply for their day's sales. Billingsgate wharf is the oldest wharf on the Thames. The fishmarket is one of the sights of London. The annual consumption of the city given in round numbers mounts up to 3,000,000 salmon; 1,200,000 lobsters; 500,000,000 oysters; and other fish to the weight of 400,000,000 pounds. The statement seems almost incredible, but sales of meat and poultry in the other markets of the city correspond. "Billingsgate" is a traditional name given to the language of the market. It has a reputation for raciness and force, rather than elegance. See LONDON.

Bills of Rights, a name for those parts of written constitutions or of codes of laws that especially guard the individual against abuse of power by the government. In English history, such documents go far back. Magna Charta in 1215 contained such provisions. The Petition of Right in 1628 extended the list and defined it more clearly. But the English document of most note in this respect was the fruit of the Glorious Revolution of 1688. In that year the tyranny of James II cost him his throne. Then a revolutionary convention—a sort of irregular parliament—drew up a Declaration of Rights (to prevent the repetition of such tyranny), and offered the crown to William and Mary if those candidates for the throne would first solemnly assent to the Declaration. This they did; and a few months later, in 1689, a Parliament in regular session reënacted the Declaration as a formal law, known as The Bill of Rights.

These three great documents,—Magna Charta, Petition of Rights, and Bill of Rights,—constitute, in the words of William Pitt, "the Bible of English Liberty." All three contain many provisons of a general political nature, not pertaining merely to a bill of rights, in the modern sense; but they also affirm and reiterate for every Englishman the following rights:

Habeas corpus privileges.

Jury trial, if accused of crime.

Exemption, in case of conviction, from excessive fines, and from cruel or unusual punishments.

Freedom from billeting of soldiery upon him in time of peace.

Quiet possession of his property, unless deprived of it by due process of law.

The right to bear arms in his own defense.

The right to petition the government at any time for redress of grievances.

All these English documents had been called forth by specific acts of tyranny, and in every case they sought to prevent the recurrence of some concrete evil. They had made no attempt to cover the whole field of civil liberty; and indeed there were many important principles of liberty known to the English common law which were not included in these written laws, as, for illustration, the principle that an Englishman's house is "his castle," into which even the officer of the law may not enter, against the owner's will, except upon a special warrant and cause shown.

Meantime English colonists in America had already begun the development of similar documents. The first written code of laws in Massachusetts, in 1641, was formally entitled "The Body of Liberties," and it put great stress upon the rights of the individual citizen. Some even more liberal features were found in the one earlier American code,—that of Plymouth in 1636. These codes, indeed, made some advance upon the written English law of the day, providing, for instance, for the privilege of an accused man to challenge suspected jurors, both "for cause" and "peremptorily."

The Stamp Act Congress of 1765 and the Continental Congress of 1774 passed Declarations of the rights of the colo-

nists; but these papers referred for the most part to public, or political, rights; and, moreover, they were merely expressions of opinion, not attempts to make new law. The next real advance came in June of 1776, when Virginia adopted the first independent state constitution in America. The introduction to that document is a "Bill of Rights" (expressly so named after English example) of seventeen paragraphs, drawn by George Mason. It contains all the English provisions mentioned above, and it expands some of them. Thus, to the usual provision for jury trial in criminal cases are added requirements that the jury shall come from the "vicinage," or neighborhood (so as to prevent such tyranny as the English government had just been attempting in carrying Americans to England for trial), and that the accused man may summon witnesses and examine his accusers.

Other provisions also had been suggested by recent troubles in the colonies, —such as the prohibition of "general" search warrants ("writs of assistance"), and the claim for freedom of the press and for freedom of religion. But the Virginia Bill of Rights introduced another element also, wholly unknown to the English documents of this nature. Nearly half the Virginia document is given to the statement of *general principles,* drawn indeed from English literature and from English and American political discussion, but never before incorporated in a constitutional document. (The common claim that these statements of principle came from French writers lacks evidence, and it is needless, since such expressions had been familiar in England for a century and a half). Among these statements in the Virginia Bill of Rights are the assertions that all authority is derived from the people; that all officers therefore are responsible to the people; that the people retain the right to change the form of government at will, and must do so from time to time to prevent decay. Perhaps the most notable passage is the opening paragraph:

> That all men are by nature equally free and independent, and have certain inherent rights, of which, when they enter into a state of society, they cannot by any compact deprive or divest their posterity; namely, the enjoyment of life and liberty, with the means of acquiring and possessing property, and obtaining happiness and safety.

Within the next few years the other twelve states of the Union adopted written constitutions (most of them within a few months), and the majority of them adopted also Bills of Rights based more or less directly upon the Virginia draft. Such Bills of Rights, too, with greater elaboration, are found in nearly all our later state constitutions.

The first constitution of our central government, the Articles of Confederation, had no provisions of this nature (applying as it did mainly to states and not to individuals). In the Federal Convention of 1789 George Mason and one or two other delegates urged earnestly that a Bill of Rights should be incorporated in the new constitution there drawn up; but the proposal was rejected. The constitution did contain a few provisions such as would have properly belonged in a Bill of Rights; namely the prohibition of *ex-post-facto* laws and of bills of attainder, and the advanced and liberal definition of treason. The more democratic portion of the people, however, were exceedingly dissatisfied; in state after state, the ratifying conventions called for the addition of such articles; and, almost as soon as the government was in operation, the omission was remedied by the adoption of the first ten amendments, which are commonly and properly known as our national Bill of Rights.

These amendments cover all the *specific* provisions of the old English Bills and most of the later ones introduced into American state constitutions up to that time. Neither the amendments nor the body of the national constitution, however, contain in any measure whatever the other element introduced into the state Bills of Rights,—the assertion of great fundamental principles. This lack, so far as it is a lack, is supplied efficiently by the popular reverence for the passages of

this nature in the Declaration of Independence. It is worth while to compare closely the opening statement of that document with the opening of the Virginia Bill of Rights (quoted above) of a few weeks earlier, and to note the superior expression and better thought of the national instrument. Happy indeed it is that to Thomas Jefferson fell the opportunity to pen that great Declaration, and to make it speak with convincing eloquence (as probably no other man of his day could have done) those prophetic truths of liberty and democracy which ever since have directed the destiny of the Western World.

Biloxi, Miss., is a popular resort, situated on Biloxi Bay, 80 miles northeast of New Orleans. It is near the site of the first settlement made on the Mississippi by white men, in 1699. In 1701, this settlement (now Old Biloxi) was abandoned after destruction by fire, and in 1712 a permanent settlement was made near the site of the old. For a few years in the early 18th century, Biloxi was the capital of the French territory in this part of North America. It was incorporated as a town in 1872, and became a city in 1896. The chief industry of this city is the canning of fish, oysters, fruit and vegetables. Population, in 1920, 10,937.

Bimetalism, the use of two metals for money. Gold and silver have been companions in all antiquity. In Genesis we learn that Abram was rich in cattle and in silver and gold. The Greek Euripides declares that "silver and gold are not the only coin; virtue, too, passes current all over the world." "Silver and gold have I none," runs the biblical quotation.

Gold has ever been regarded as the more precious metal. "Speech is silver, silence is golden," say the Germans. The silver coin must be the larger to have an equal value. If the silver dollar be too large, the payer will hold it and pay out gold. If the silver dollar be too small the payer will hold his gold and pay out silver.

At various times in the history of the United States, gold has disappeared from circulation, being hoarded or sold as bullion; and again silver has disappeared. Even though the proportionate weight of silver and gold coins be fixed by law, the discovery of new supplies of one or the other disturbs the balance. It is as difficult to fix the number of ounces of silver worth an ounce of gold as to say beforehand how many pounds of oats are to be worth a bushel of wheat.

To prevent the retirement of either gold or silver from circulation, and a consequent shrinkage in the amount of coin available for the transaction of business, the bimetalists favor a scientific ratio of values fixed by international agreement. If this standard should be fixed at sixteen to one, for instance, they would urge the government to coin all the gold and silver offered, making the silver of any denomination sixteen times as heavy as the gold coin of equal face value. The opposing view is that some one metal should be used as a standard.

Most nations of the world now adopt a single standard, coining gold freely and using other metals for coins of small value. Gold is kept in circulation by making the other coins exchangeable for gold at the national treasury. Mexico is one of the nations to adopt a gold standard recently.

See MONEY; MINT; GRESHAM.

Binding Twine. See SISAL.

Bingen, bĭng′en, a city of about 8,000 inhabitants on the west bank of the Rhine. It is a center of the wine trade. The American schoolboy is familiar with the verses of Mrs. Norton's poem beginning "A soldier of the legion lay dying in Algiers." Each stanza closes with the refrain: "Fair Bingen on the Rhine."

Bingen is indeed a fair city. A castle still lies behind it; the Rhine in full majesty flows at its foot. A mile or two down the river stands the famous Mouse Tower of the Rhine. It stands on a quartz rock in the middle of the river. It is in reality an old watch tower. The original German name is Musen, meaning to watch. The modern spelling is used, however, in deference to a popular legend. According to this tradition, it appears that during a period of famine the cruel archbishop Hatto caused a lot of poor people to be shut up in a barn and burned to death to

save feeding them. In punishment for an unfeeling remark that they were of no more value than so many mice, he was attacked by a multitude of mice, and given rest neither day nor night. He fled to the Mouse Tower, but was followed by these little animals and devoured.

On the east side of the river, surmounting a high bluff, rises the Niederwald Denkmal, a national war monument commemorating the victories of the Germans in the War of 1870 and the restoration of the German Empire. A noble gowned figure of Germania in bronze stands on an architectural base 78 feet high.

Binghamton, New York, county-seat of Broome County, is situated on the Susquehanna River, and the Erie and other railroads, 81 miles southeast of Syracuse. It is the center of a rich agricultural region, and is a distributing point for dairy products. The chief manufactures are carriages and wagons, engines, glass, pottery, flour, cigars, boots and shoes, furniture, clocks, hats, clothing, leather, etc. Among Binghamton's public buildings are the Central High School, Federal Government offices, a fine opera house, a courthouse, and a state armory. A state asylum for the insane and two homes for orphaned children are located here. Population, 1920, 66,800.

Biology, that branch of science which deals with life. The science of animal life is called zoölogy; that of plant life, botany. Biology includes, therefore, these two sciences, as well as a certain borderland between them. Science is unable, for instance, to state definitely whether certain minute organisms are plants or animals.

A topic like this, uncertain of a reception under either branch of the subject, may still find a place under biology.

In its broadest sense biology deals with the life of all living things, and this is the sense in which the term is employed in America, England, and France, while German scientists limit it to the general habits and life histories of animals and plants. Both Herbert Spencer and Huxley, among the world's greatest students of biology, accept the term as signifying the science and study of the properties common to all living things, as distinguished from the properties of things without life.

Men have always been interested in speculation and study of the nature of life. It was natural for men at first to think of all things as possessing life akin to human existence. Indeed, as Voltaire said, man did not even hesitate "to construct God in his own image." But in the onward march of science, this view of things was discarded, and man began to realize the complicated nature of the system that governs all living things. The older and common belief that all living things are alive because of some vital principle or spirit of life which departed from them at death, has gradually been giving way to the modern scientific theory that there is no such specific vital force, but that life, so called, is only a name for certain manifestations of certain types of matter. Living matter is held by the biologist to be only "a particular and very elaborate arrangement of ordinary matter," and while we have as yet no definite knowledge of the origin of life, it is claimed that everything points towards this conclusion: "That during the gradual cooling down of this planet a state of affairs arose which inevitably led to the production, in that cosmic laboratory, of molecules which were alive in that they had the power of reproducing themselves and reacting to stimuli, and gave rise to the living things that we see today; in other words, that there has not only been an evolution of all living things from one common ancestor, but of all life from not-life."

Spontaneous Generation. Under present conditions, which must be very different from those existing when life first began, there do not seem to be any spontaneous transformations of lifeless into living matter. No life without preceding life is now the universal rule on the earth. This rule is a development of modern biology, arrived at after an immense amount of research by men of science. There have always been folklore and traditions to the effect that some forms of life arise spontaneously, like the country superstition that a horsehair placed in a pond will develop into an eel; that maggots arise from decaying meat, and that disease and pestilence

arise without any other original cause from marshlands and in crowded communities. But these and like beliefs have been dissipated by the invention of the microscope and its revelation of the invisible world of bacteria and other low forms of life, which caused many of the phenomena formerly alleged to be due to spontaneous generation. Pasteur's experiments finally showed that wherever there had been an appearance of "spontaneous" life, otherwise unaccounted for, it was due to living but invisible "germs" transported through the air. The present attitude of the biologist therefore is that every organism living today has descended from a pre-existing organism.

PROTOPLASM. Protoplasm is regarded as the physical basis of life, the living part of all animals, as distinguished from the non-living parts, such as hair, the hard parts of bone, or accumulations of fat or starch, which are merely products of life's activity. The microscope shows protoplasm to be a semi-liquid substance, slightly granular, and of the utmost chemical complexity, although apparently simple. The lowest animal forms are simply bits of this living matter, yet they contain the rudiments of all the properties found in the highest animals and the most delicate organs. On this structure of protoplasm, therefore, the biologist asserts that, since it is capable of reproduction, evolution has brought into being a million known species of animals and plants, ranging, as Professor Huxley says, "from a whale to a flea, an oak to a toadstool, a tapeworm to a bird, a bacterium to a lily, a jelly-fish to an ant-community, a worm to a philosopher."

CELLS. The body of every man and woman alive has grown from a minute cell, and itself consists of a mass of cells, for the most part microscopic in size. The blood, brain, tissue, and outer skin are all composed of cells, and reproduction in men and animals is carried out by the setting free of special cells. The nature of these innumerable cells and their varied functions are now the prime object of biological research, and new fields are constantly being opened for the investigation of the complicated machinery of living organisms, with the ultimate object of prolonging the normal life of man by decreasing the ravages of disease and increasing the number of those who die a natural death through the senile decay which even the biologist admits to be inevitable.

Birch, trees or shrubs growing principally in the north temperate zone. The birch ranges farther north than any other deciduous forest tree. Some thirty-five kinds are to be found in the United States, Canada, northern Europe, and part of South America and Central Asia. A shrub-birch is found in the colder sections of South America. The timber of many species,—the white, the red, and the yellow,—is valuable for fuel, furniture, and inside finish. Curly birch finishes almost as handsome as bird's-eye-maple. Birches are classed with oaks, hazlenuts, and alders on account of their fruit, which is a naked nutlet inclosed, when ripe, in dry scales. Birches vary in size from large trees to the dwarf birch easily mistaken for hazel brush or willow. Birches are exceedingly graceful trees. Several species, including weeping birches as well as a handsome species from Japan, are valuable park trees.

The outer bark of many species of birch separates into thin layers which may be used as paper. Many trinkets, as napkin rings, toy canoes, baskets, and the like, are made of the outer bark of the American paper or canoe birch. The entire bark of this tree is perhaps a third of an inch thick, and contains an oil or resin that renders it water-tight. It is much used for canoes. The bark, taken from the tree in large sections, is sewed over a frame of light strips of wood. The seams are closed with pitch.

Woodsmen find birch bark an invaluable source of fuel. Pieces may be stripped from living trees, or, if rotten trees are at hand, the rotten wood can be shaken out until the bark is empty, like a piece of stove pipe, sound and oily, ready to catch fire in any weather, wet or dry.

Vast areas in Russia are covered exclusively with white birch. The Russian peasants make wine out of its sap, and, in time of famine, grind the bark for bread. They make millions of shoes out of the

bark; and spoons, platters, cups, and plates of the wood. Russian emigrants bring their effects to this country in birch bark chests curiously ornamented.

The pliant twigs of the birch are proverbially tough. Bound in small bundles they made the broom or besom of our ancestors, and are still used for that purpose. The Roman magistrate ordered bundles of birch rods *(fasces)* carried before him as a sign of his authority, and to this day the schoolmaster is called a "wielder of the birch."

The birch, most shy and ladylike of trees,
Her poverty, as best she may, retrieves,
And hints at her foregone gentilities
With some saved relics of her wealth of leaves.
—Lowell, *An Indian Summer Reverie.*

Bird, a feathered animal. Scientists put much more into the description of a bird, as air-breathing; having a backbone; warm-blooded; two pairs of limbs, the front pair of wings used for flying or swimming, the hind pair, legs used for walking or swimming; reproducing by hard-shelled eggs, hatched externally; but, after all, the proverb holds true that "a bird is known by its feathers." All birds have feathers. No other animal has feathers. At first thought, flying might be considered a characteristic of birds, but bats fly, and some birds, as the auk, penguin, and ostrich, do not fly.

In the scale of animal creation, birds are lower than mammals and higher than reptiles. A study of fossil birds, of which some five hundred species are known, leads to the conclusion that birds have been developed from reptiles. The earlier birds seem to have been flying reptiles, with teeth, long tails, and scaly feathers.

Living birds may be classified conveniently as follows:

I. Perching birds—thrush, kinglet, nuthatch, tree-creeper, dipper, wren, wagtail, warbler, vireo, shrike, waxwing, swallow, tanager, finch, blackbird, crow, horned lark, and flycatcher.
II. Goatsuckers, nighthawks, swifts, and hummingbirds.
III. Parrots and macaws.
IV. Woodpeckers.
V. Cuckoos and kingfishers.
VI. Birds of prey—eagle, owl, vulture, condor, and hawk.
VII. Pigeons and doves.
VIII. Scratching-birds—quail, grouse, turkey.
IX. Shore-birds—plover, woodcock, snipe.
X. Cranes and rails.
XI. Herons and egrets.
XII. Flamingoes.
XIII. Swimmers with comb-edge bills—duck, goose, swan.
XIV. Fully webbed swimmers—pelican, darter, cormorant.
XV. Tube-nosed swimmers—albatross.
XVI. Long-winged swimmers — gull, and tern.
XVII. Diving birds—loon, grebe, auk, murre.
XVIII. Flightless divers—penguin.
XIX. Flightless runners—ostrich, cassowary.

Bird Anatomy shows the parts of a bird; a knowledge of these parts is helpful in studying descriptions by ornothologists. See Figure 31 in the plate.

Bird Study. Nearly every one is so situated that he may become familiar with our common birds so that he can recognize them by their plumage and their song. Most of this information may be gained incidentally as one walks through city parks or takes rambles in the country. Birds are shy, and caution is necessary in approaching them. It is usually wise for the observer to pretend to be looking for something else. Brown or dark gray clothing that blends with the color of the soil and the trunks of trees should be worn when one is on a bird studying expedition since bright colors frighten birds away. The most successful efforts are those made for attracting birds, such as placing food near the house where they can easily find it. If the supply is constant and the birds are not frightened they will soon become quite tame and allow one to approach near enough to observe them carefully.

Providing nesting places in the grounds adjoining the house assures the presence of several pairs of birds during the season,

1. Alimentary canal; (a) gall bladder; (b) appendix.

FEET—2. Half web—Saber bill. 3. Lobe foot—Water hen. 4. Clawfoot—Hawk. 5. Padded foot—Ostrich. 6. Scratching foot—Pheasant. 7. Oar foot—Tropical bird. 8. Perching foot—Thrush. 9. Walking foot—Kingfisher. 10. Web foot—Swan. 11. Climbing foot—Woodpecker. 12. Cloven web foot. 13. Stilt foot—stork. 14. Weak foot—Goatsucker.

HEADS AND BILLS—15. Flamingo. 16. Spoonbill. 17. Bunting. 18. Thrush. 19. Sawbill. 20. Falcon. 21. Pelican. 22. Dove. 23. Scissors bill. 24. Avocet. 25. Shoebill. 26. Gap bill. 27. Arassari. 28. Ibis. 29. Goatsucker. 30. Stork.

PARTS OF THE PLUMAGE—a. Frontal. b. Crown. c. Occipital. d. Nasal duct. e. Cheek. f. Breast. g. Belly. h. Rump. i. Croup. k. Tail feathers. l. Back. m. Primary quills. n. Secondary quills. o. Coverts. p. Pinions. q. Shoulder pinions.

BIRD ANATOMY.

COMMON BIRDS

Baltimore Oriole.
Bobwhite.
Sandpiper

Screech Owl.

Robin.
Woodpecker.
Mallard Duck.

and much can be learned of their habits by mere casual observation. A good bird guide such as Chapman's *Color Key to North American Birds* and *Birds of the Eastern United States* and Reed's *Bird Guide* is helpful in enabling one to determine species. Opera glasses are also helpful but not essential. There is no month in the year when bird study is not practicable.

Protection of Birds. Birds are among the farmer's best friends. Unfortunately many farmers do not understand this. They consider birds as their enemies and try to destroy them because some birds eat a small quantity of fruit or destroy a few young plants. Excepting the English sparrow, which feeds almost entirely upon grain, all common birds feed upon insects, and weed seeds. Most of these insects destroy wheat, corn, garden vegetables and the foliage of shade and fruit trees. It is estimated that the ravages of insects cost the farmers of the United States over $200,000,000 annually. Were it not for the birds, the loss would be much greater. The following summary of what our common birds eat, for which we are indebted to Prof. T. L. Washburn, professor of entomology of the Minnesota Agricultural Experiment Station, shows the value of our common birds as destroyers of insect pests.

Rose-breasted Grosbeak.—Extremely fond of potato beetles, eats hairless caterpillars, Gypsy moth larvae.

Black-Billed Cucoo.—One of the few birds eating hairy caterpillars, devours the larva of the brown-tailed moth and the spiny elm caterpillar.

House Wren.—Ninety-eight per cent of its food composed of animal matter, insects, etc., a valuable friend in the garden.

Chipping Sparrow.—Over twenty-five per cent of its food consists of injurious insects, plant lice, leaf-eating beetles, canker worms, and caterpillars of various sorts.

Downy Woodpecker.—Feeds on borers, weevils, caterpillars, ants and plant lice, wooly aphis, apple worms, moths and insect eggs; a friend of the fruit grower and lumberman.

Chickadee.—Eats eggs of tent caterpillars and canker worms, destroys codling moth and apple worm, Gypsy and brown tail moths and destroys plant lice and their eggs.

Screech Owl.—One of the farmer's best friends, since it consumes large quantities of common mice, field mice, caterpillars, beetles, etc.

Quail.—One of the most useful birds. Eats seeds of weeds and takes but little grain or useful berries, destroys grasshoppers, chinch bugs, army worms, potato beetles, cucumber beetles, May beetles, wire worms, etc. Over one hundred potato beetles found in stomach of one quail.

Scarlet Tanager.—Feeds particularly on insects affecting oak trees, destroys Gypsy moth.

Song Sparrow.—Fifty per cent of its food consists of seeds of weeds, also eats cabbage plant lice, cut worms, leaf hoppers, spittle insects, grasshoppers.

One unacquainted with such work as Prof. Washburn's can scarcely realize the patience and time necessary to obtain the information. Several seasons must be devoted to observation and many specimens must be examined and the results recorded in obtaining accurate data. Bird study in schools and talks at agricultural meetings on the value of birds assist in their preservation.

Government protection is now extended to birds by both national and state or provincial legislation by setting apart tracts of land or water such as islands and marshy places and regions in mountainous districts as bird reservations. These reservations are in charge of caretakers and visitors are seldom allowed to enter. Every state and Canadian province has game laws which prevent the careless destruction of wild birds. See Audubon; Archaeopteryx; Migration of Birds; Nests, and the articles on the birds mentioned in the table. See color plates on birds in these volumes.

Bird Day, a day set apart and celebrated in many schools for the purpose of interesting girls and boys in the matter of protecting wild birds. Bird Day was observed first in 1895 at Oil City, Pennsylvania, at the suggestion of Professor C. A. Babcock. On Bird Day the school rooms are made attractive with greenery, flowers, and pictures of birds, and appropriate exercises are held. In some states the celebration is combined with that of Arbor Day.

Bird of Paradise, a family of birds found chiefly in New Guinea, northern Australia, and adjacent islands. The family is related to that of the crow. The species vary in size, however, some being no larger than a sparrow. The common name is derived from the magnificent plumage of the male, particularly that of the tail

and wings, and sometimes shoulder tufts, which extend frequently to several times the length of the body. Rich colors,—purples, orange, scarlet, crimson, steel green, violet, and glossy black,—with deep metallic lusters, prevail. The commercial demand for the feathers has led to the destruction of these birds in great numbers. All are forest birds, spending their lives in noisy flocks amid the tree tops. They live chiefly on berries, seeds, and insects. Some species examine the trunks of trees like creepers, and a few descend to the ground for worms and snails. Their nests are for the most part loose, careless platforms of sticks, built pigeon fashion. During the nesting season the gay colored male remains at some distance, probably for prudential reasons, so as not to attract enemies, while the quietly clad female takes care of the nest.

Birmingham, an important city of Alabama, the county seat of Jefferson County. It is situated 95 miles northwest of Montgomery, and 168 miles southwest of Atlanta. The Louisville & Nashville, Mobile & Ohio, Alabama, Great Southern; Illinois Central, Central of Georgia, Seaboard Air Line, Atlanta, Birmingham & Atlantic; Southern & Frisco railroads enter the city. There is a complete system of electric lines connecting the city with its suburbs and with neighboring towns. Birmingham is located in a valley rich in coal and iron—three great coal fields surrounding it—and rises 608 feet above the level of the sea. It has broad, well paved streets and many parks, the latter covering some 600 acres.

Industries and Manufactures. Birmingham is rapidly forging ahead as a commercial city. Its annual output of iron is about 2,000,000 tons. Because of its large steel industries it is called the *Pittsburgh of the South.* Other industries are cement and fertilizer factories, lumber mills, clay pipe and brick plants, the marketing of cotton, and the manufacture of cotton seed products.

Buildings. The principal public buildings include the United States Government building, the city hall, the courthouse. Other buildings are the First National Bank building, a Y. M. C. A. building, a $2,000,000 terminal station, also several large skyscrapers and modern hotels. There are, besides the public schools, several colleges, among them Howard College (Baptist) at East Lake, Birmingham-Southern College (Methodist) at Owenton Heights, also the Boys' Industrial School, a normal school for colored teachers, and two dental colleges.

History. Birmingham was incorporated in 1871. The city had several disasters, from which it rapidly recovered, but its real growth began after 1889. In 1910 the Greater Birmingham law went into effect, when the suburbs, North Birmingham, East Birmingham, Avondale, Woodlawn, Wylan, East Lake, Ensley, Pratt City, Elyton, and West End, became a part of Birmingham proper. A commission form of government was adopted in 1911. Population 1920, 178,806.

Birmingham, bĕr′mĭng-ăm, an English city. It is situated 112 miles northwest of London. It is at the geographical center of England. It lies at the edge of the coal and iron districts, and is one of the great manufacturing cities of the world. It had in 1921, 919,438 people, rather more than our Pittsburg, which, in point of grime, smoke, and an industrial population, it strongly resembles. Cotton spinning and metal working are the leading lines of industry. Jewelry, silver, and plated ware, hooks and eyes, buttons, pins, screws, steel pens, nails, glassware, guns, ammunition, locomotives, steel rails, and implements are made in enormous quantities, not only for the British market, but for export to the colonies. Birmingham makes a greater variety of metal articles than any other city in the world.

Many of the problems of governing a workingmen's city have been studied here. The city owns its own gas and electric works. Water is brought from Wales, eighty miles distant. Public schools, with compulsory attendance, the tearing down of slum districts, sewerage, manual training schools, and public baths have been looked after with a degree of energy and an honesty of management that may well arouse the emulation of Americans accus-

tomed to flatter themselves that theirs is a well governed country.

Birmingham is the leading hardware city of the world. As early as 1727 the number of persons employed in the manufacture of hardware was as high as 50,000. The city owns its public utilities. It has a fine sewer system, and was the first city in England to establish municipal baths. Birmingham has also constructed several lines of street railways, which it leases to private companies. It also owns its own markets, having bought them in 1824, and they yield a profit of over $50,000 a year. The city parks, numbering more than ten, are also owned by the city. In the 18th century, Birmingham became a Liberal center, and in the 19th a leader in reform and chartism. It is one of the best managed cities in the world.

Birth. The ancient common law held that a child must be heard to cry to gain the status of a living person. But in recent years more rational methods of establishing a child's legal status have been adopted. Birth is not, however, considered to take place until the complete separation of the child from its mother and the beginning of its independent system of circulation. Legally, even before birth, a child is sometimes regarded as a living person and may inherit property. See INHERITANCE.

Birthdays of Famous People.

JANUARY BIRTHDAYS.

1	Paul Revere	1735
6	Joan of Arc	1412
17	Benjamin Franklin	1706
18	Daniel Webster	1782
19	James Watt	1736
	Robert E. Lee	1807
	Edgar A. Poe	1809
22	Lord Byron	1788
	Francis Bacon	1561
25	Robert Burns	1759
27	Wolfgang Mozart	1756

FEBRUARY BIRTHDAYS.

3	Horace Greeley	1811
	Felix Mendelssohn	1809
	Sidney Lanier	1842
7	Charles Dickens	1812
8	John Ruskin	1819
	William T. Sherman	1820
10	Charles Lamb	1775
12	Abraham Lincoln	1809
	Charles Darwin	1809
15	Galileo	1564
19	Copernicus	1473
22	George Washington	1732
26	James Russell Lowell	1819
	Victor Hugo	1802
27	Henry Wadsworth Longfellow	1807
28	Michel Montaigne	1533

MARCH BIRTHDAYS.

6	Michelangelo	1475
7	Sir Edwin Landseer	1802
18	John C. Calhoun	1782
21	Robert Bruce	1274
22	Vandyke	1599
28	Raphael	1483
30	John Fiske	1842

APRIL BIRTHDAYS.

2	Thomas Jefferson	1743
	Hans Christian Andersen	1805
	Charlemagne	742
3	Washington Irving	1783
7	William Wordsworth	1770
12	Henry Clay	1777
20	Marcus Aurelius	121
22	Madame de Staël	1766
23	William Shakespeare	1564
25	Oliver Cromwell	1599
27	S. F. B. Morse	1791
	Ulysses S. Grant	1822

MAY BIRTHDAYS.

1	Joseph Addison	1672
4	Horace Mann	1796
	John James Audubon	1780
7	Robert Browning	1812
13	Linnaeus	1707
14	Fahrenheit	1686
21	Plato	B. C. 429
22	Alexander Pope	1688
22	Richard Wagner	1813
24	Queen Victoria	1819
25	Ralph Waldo Emerson	1803
27	Dante	1265
28	Louis Agassiz	1807
29	Patrick Henry	1736

JUNE BIRTHDAYS.

1	Ben Jonson	1573
12	Charles Kingsley	1819
13	Thomas Arnold	1795
14	Harriet Beecher Stowe	1812
17	John Wesley	1703

28 Jean Jacques Rousseau 1712
29 Peter Paul Rubens 1577

JULY BIRTHDAYS.

4 Nathaniel Hawthorne 1804
6 John Huss 1369
12 Julius Caesar .....B. C. 100
Henry D. Thoreau 1817
15 Rembrandt 1607
18 William M. Thackeray 1811
27 Thomas Campbell 1777

AUGUST BIRTHDAYS.

4 Percy Bysshe Shelley 1792
6 Alfred Tennyson 1809
9 John Dryden 1631
Izaak Walton 1593
15 Napoleon Bonaparte 1769
Walter Scott 1771
23 Baron Cuvier 1769
28 Johann Goethe 1749
29 Oliver Wendell Holmes 1809

SEPTEMBER BIRTHDAYS.

6 Lafayette 1757
7 Queen Elizabeth 1533
15 James Fenimore Cooper 1789
18 Samuel Johnson 1709
21 Savonarola 1452
27 Samuel Adams 1722

OCTOBER BIRTHDAYS.

4 Jean Francois Millet 1814
6 Jenny Lind 1820
14 William Penn 1644
16 Noah Webster 1758
21 Samuel T. Coleridge 1772
25 Thomas B. Macaulay 1800
29 John Keats 1795

NOVEMBER BIRTHDAYS.

1 Marie Antoinette 1755
3 William Cullen Bryant 1794
7 Mary, Queen of Scots 1542
10 Martin Luther 1483
Oliver Goldsmith 1728
15 William Cowper 1731
22 George Eliot 1819
29 Wendell Phillips 1811
30 Jonathan Swift 1667

DECEMBER BIRTHDAYS.

4 Thomas Carlyle 1795
9 John Milton 1608
Gustavus Adolphus 1594
13 William Lloyd Garrison.....1805
Phillips Brooks 1835
16 Ludwig Beethoven 1770
17 John G. Whittier 1807
25 Isaac Newton 1642
26 Thomas Gray 1716
29 William Ewart Gladstone 1809

Birthday Stones, gems considered particularly appropriate for birthday gifts. Any precious or semi-precious stone is considered appropriate as a setting in an article of jewelry intended for a birthday present. A preference for certain stones for certain months of the year has grown up, perhaps unconsciously. It would be difficult to trace the association between the month and the stone deemed appropriate. The popular list is:

January ..... Garnet
February ..... Amethyst
March ..... Bloodstone
April ..... Diamond
May ..... Emerald
June .....Lapis Lazuli
July ..... Ruby
August ..... Moonstone
September ..... Sapphire
October ..... Opal
November ..... Topaz
December ..... Turquoise

Birth-Rate, is the number of births per year for a given unit of population, usually 1,000. A study of the birth-rate of European nations and the United States for the half century ending with 1920 shows a marked decline. In the United States there were 35.1 births per 1,000; in 1920 the birth-rate was 23.7 per thousand; in 1921 it was 24.3 per thousand.

Among the European nations, before the great war, France had the lowest birth-rate, 24.6; Hungary had the highest, 42.2.

The following are pre-war records:

Australia 25.5
Austria 35.0
Belgium 27.5
Denmark 29.2
Germany 20.9
India 48.0
Ireland 23.6
Italy 31.5
Norway 27.9
Prussia 36.1
Scotland 28.6
Spain 35.6
Sweden 25.7
United Kingdom 28.2

Bisbee, a city of southern Arizona, situated in a cañon of the Mule-Pass Mountains and on the El Paso and Southwestern Railroad. The city is notable especially for its copper mines, the Copper Queen and the Calumet and Arizona, which are among the richest of the world. The city is well built and prosperous, has an excellent school system, a public library, city waterworks, electric lights, and electric street cars. Its population in 1920 was 9,205.

Biscuit, bĭs′kit, a word which has come into our language through the French, from the Latin, and means literally twice-baked. Gibbon, the historian, tells us that the biscuits of the Roman soldiers were actually prepared twice in the oven. The term has come to be used to designate a hard, dry bread made without yeast, baking-powder or soda, usually formed into small, flat cakes.

In the United States, the word biscuit is used as defined above by manufacturers and dealers, and appears on packages of the various kinds of these articles, but in everyday use it is far less common than the term cracker. At the home table, biscuits are small, round, soft cakes made of milk and flour, with salt, a little lard for shortening and baking powder or soda to raise them. If lightened with yeast they are called raised biscuit, or more commonly, rolls.

The manufacture of biscuits or crackers is done by machinery entirely, and as anyone knows who visits groceries, the variety is endless. The dough is mixed and kneaded in a machine, rolled between iron rollers and carried to the cutting machine on webs of canvas. The scraps remaining from the cutting are carried back automatically to the rollers and the process repeated. The crackers are carried to the oven on a traveling frame of wire gauze. After baking, they are packed in boxes by machinery, so that in a model factory the biscuits are never touched by the hand from start to finish. See YEAST; BREAD.

Bishop, literally an overseer, from the Greek *episcopus.* In the Greek, the Catholic, and the Episcopal churches, the name is given to those priests of the highest order who are held to be the successors of the twelve apostles. In Russia the bishops are appointed by the czar who is the head of the church. In Catholic countries the practice varies. The bishops are named, however, either directly by the pope, or by an agreement between the pope and sovereign. In the Church of England bishops are named by the sovereign. Of twenty-eight English bishops twenty-six are entitled to a seat in the House of Lords. In the United States the title is used in the Catholic, Episcopal, and Methodist churches. In general the bishop is supposed to travel and visit the various churches in his charge, examining into and settling difficulties, confirming members, and advancing the interests of his congregations. His home church in which he has a pulpit, a chair, or cathedra, is called a cathedral. See ARCHBISHOP.

Bismarck, bĭz′mark (1815-1898), a German statesman. His full name is Otto

Bismarck, on his seventieth birthday, April 1, 1885.

Eduard Leopold Bismarck-Schoenhausen. He was born at Schoenhausen, in Brandenburg, April 1, 1815, and died at Friedrichsruh, July 30, 1898. Bismarck was a university student of Göttingen, Berlin, and Greifswald, and served his regular term in the army. He devoted his early manhood to the management of the paternal estates. He came to notice in 1849 as a member of the Diet of Prussia. He was a man of massive, commanding appearance, who knew his own mind. He was recognized at once as a new force in Prussian politics. He was appointed Prussian delegate at Frankfort, where he met representatives from other German states, among whom he contracted friendships and enmities that lasted through life.

At this time Austria was the dominating influence in the German Confederation. Her representative carried himself, it was thought, in a supercilious manner. Bismarck was recognized at once as a man of powerful intellect and individuality. He became the leader of anti-Austrian forces. To go into Bismarck's career would be to write the history of Germany for a period of thirty years. To set aside Austria and make Prussia the leading German state became the ruling ambition of his life. We must be content with saying that under King William of Prussia, afterward Emperor William I of Germany, Bismarck, the prime minister, Von Roon, minister of war, and Moltke, commander of the army, built up the most efficient army on the face of the globe. They robbed Denmark of Schleswig Holstein in 1864, expelled Austria from the German Confederacy in the Six Weeks' War of 1866, and humiliated Napoleon III in the Franco-Prussian War of 1870-71. Bismarck was the leading spirit in it all. Though others wavered, he never did. At a meeting of the representatives of the northern German states, held in the magnificent hall of Versailles during the siege of Paris, Bismarck had the satisfaction of hearing his king proclaimed emperor of Germany.

Bismarck was a wonderful man for having his own way. He used to say that his greatest diplomatic successes came from saying exactly what he meant. While others accustomed to a more politic or deceptive way of speaking were looking for some hidden meaning, he carried his point. He was arbitrary. At one time he sent the Prussian legislature home because it would not vote money. He announced that the government would get on without a legislature. At times he was hampered by the jealousy of his fellow officials, and there was always a chance that some one might supplant him in the affections of the king. He says himself that more than once he waited in the king's anteroom trembling from head to foot lest the person then holding audience with the king, possibly a foreign ambassador, might induce William to adopt some unwise measures and overthrow all his plans. At the close of the war with France, he was loaded with titles and wealth, and was recognized as the foremost man in Europe. If ever a man built up an empire Bismarck did. It is not pleasant to know that in his later days the successors of his old king and emperor slighted him, and turned him off, 1890, like an old horse that had served its days of usefulness. It is safe to say that no other man of his century accomplished so much in the political field as did Bismarck.

Although Bismarck had reason to resent the treatment he received from his political enemies in Berlin, it must not be supposed that he ended his days in neglect. His private means were sufficient. His home and grounds at Friedrichsruh were comfortable, spacious, and beautiful. He was happy in all his family relations. He delighted in books, walks, drives, and hospitality. A secretary relieved him of the drudgery of correspondence.

The eightieth anniversary of his birthday was observed by half Europe. Sixty-eight thousand gas jets "lit Lombard Bridge—Hamburg's Rialto." Delegations from twenty-eight German universities came from the Baltic, the plains, and the Alps to Friedrichsruh to pay their respects and honor the Unifier of Germany. Four thousand students, led by six military bands, appeared on the lawn with

eagle-emblazoned banners. They shouted themselves hoarse on the appearance of the man who was more to them than emperor and marched away singing *Die Wacht am Rhine.* Thirty-five special trains brought visitors. Seventy newspaper correspondents and five special telegraph wires told the world of gifts, speeches, and greetings. It was the greatest ovation ever accorded a person in private life—a greeting such as the American people might have extended to Abraham Lincoln had he lived to a similar age. Some notion of the stir may be had from the statement that the village postoffice handled 11,475 telegrams comprising 450,000 words. Bismarck received several thousand telegrams, 1,044 packages, 955 registered letters, and 450,000 ordinary letters and pieces of mail during the birthday week.

Professor Andrew D. White, United States ambassador at Berlin, who had every opportunity to know the great statesman, characterized Bismarck as, "big rumbling, heavy, fiery, minatory, objurgatory,—the greatest German since Luther."

See GERMANY; FRANCO-PRUSSIAN WAR.

Bismarck, bĭz′märk, the capital city of North Dakota. It is situated on the Missouri River and on the Northern Pacific, and the Minneapolis, St. Paul & Sault Ste. Marie railroads. Bismarck is important as a trading center being the base of supplies for the Indian agencies and military forts, and is the seat of a large and rapidly growing wholesale trade. The state capitol is the most noteworthy building. The state penitentiary, two hospitals, the state library, county courthouse, and a government Indian school are here. Among industries may be mentioned flour mills, grain elevators, and machine shops. Bismarck was the capital of Dakota Territory from 1883 to 1889 when it was made capital of the state of North Dakota. Its population in 1920 was 6951.

Bismuth, a metallic element. Specific gravity 9.82. Bismuth melts at 510° F. It is of a light reddish color. It resembles lead in some respects, but it is so brittle that it crumbles into a powder under the hammer. Bismuth is seldom used by itself in the arts, but its alloys are of commercial importance. Lead is hardened and toughened by the addition of bismuth. A soft solder, consisting of one part of bismuth, one of tin, and one of lead, is used by pewter workers. A second alloy containing five parts of bismuth, three of lead, and twenty of tin is used in stereotyping. This alloy melts at the boiling point of water. Metallic plugs of a similar alloy have been used in steam boilers, the idea being that they would melt when the heat rose beyond a certain point, and permit the escape of steam without bursting the boiler; but these plugs harden when in use and cannot be depended upon to melt at the critical moment.

One compound of bismuth is used in medicine as an astringent. In large doses it acts as a poison, and, when applied to the face as a cosmetic, it is said to paralyze the nerves. Bismuth is the basis of so-called sympathetic inks.

The *Americana* states that not over fifty tons of bismuth are used annually, and that the price ranges all the way from fifty cents to five dollars a pound. The metal is obtained from mines of Saxony, Austria, Norway, Cornwall, Spain, California, New South Wales, and certain mountainous districts of South America.

Bison, or **Buffalo,** a wild animal of the ox kind, closely related to the wild ox or bison of Europe, but not to the Old World buffalo. It formerly ranged over the greater part of North America. Herds were known certainly in New York and Virginia. They were once abundant in the prairies and openings from the Tennessee River to the Great Lakes, but the natural home of the buffalo may be said to have been the grassy plain extending from Texas to Great Slave Lake. They penetrated the passes and parks of the Rocky Mountains, but are not known to have grazed west of the Sierra Nevada range. The extension of settlements early drove the buffalo westward across the Mississippi. After the Civil War, the building of the Union Pacific and Kansas Pacific railways cut their range into fragments. Trains were not infrequently impeded in early days by immense droves, but the murder-

ous fire of passengers and the still more destructive methods of innumerable hunting parties, many of them from Europe, that slaughtered for the pleasure of killing, or for the sake of pelts, cleared the central part of the range as early as 1875. The southern buffaloes were all killed off as early, it is said, as 1890. Congress made the first appropriation for the purchase and maintenance of bison in 1902, at which time there were only 1,750 of these animals alive. There are now about 10,000 of them, 6,000 in Canada and 4,000 in the United States. In the United States government herds there are 1,250 bison, all but about 130 of which were born on reservations. The largest herd, 560 head, is in Yellowstone Park. Montana Bison range has about 400, the Wichita Preserve over 125, and Wind Cave over 70. A small herd lives peacefully in the Washington, D. C., Zoological Gardens.

Canadian Herds. With the exception of one herd of woods bison, estimtaed to number about 500 head, the bison has long since disappeared from his native haunts. In 1909, however, the Canadian government placed 400 animals in Wainwright Park, Alberta. Occasional additions and the natural growth of the herd increased this number to 6,000. This is the largest herd of bison in the world. A much smaller herd, numbering about 300, is kept at Lamont, Alberta, in Elk Island Park, and a few animals are also kept for exhibition at Banff.

Buffaloes differ from cattle only in appearance. The head of the bison is broad, with short, outwardly curved horns, and covered with a shaggy mop of hair almost concealing the small eyes. The hair is crisp and woolly, and easily woven into cloth or twisted into ropes.

Buffalo society was organized not unlike that of cattle. A unit consisted of a patriarchal old bull in the lead, followed by several cows and their young. Whether going to pasture or seeking water, each family traveled in single file. In the springtime, thousands of families marched in search of new pastures together, forming vast herds extending farther than the eye could reach. On the approach of winter these nomadic animals again turned southward, or retired into the sheltered valleys of the rivers and mountain ranges. When pursued on the plain, the buffalo ran with a lumbering gallop, holding its head so low that its front feet rose and fell past the side of the head. In its migrations the buffalo swam with ease and climbed with agility, but naturally followed the easiest lines of travel. Its sharp hoofs, passing and repassing in countless thousands for season after season, cut deep trails in the prairie turf and mountain passes of which portions may be seen to this day. Surveyors locating a road or railway across the then unknown mountain ranges found it expedient to follow the pathways of this native engineer. Coyotes and wolves followed these migrations to drag down calves, spent buffaloes, or some chance male wounded in a contest with his rivals, and buzzards kept a lookout for a share in the spoils. In fly time the buffalo was fond of a wallow in the mud, or of throwing sand and gravel over himself by pawing or tossing his horns. Settlers find buffalo bones in the swamps they now drain for meadows. Buffalo pits worn deep by ages of pawing and scraping may still be seen.

The buffalo has played no small part in the life of the western Indian, taking the place of the Virginia deer of the Atlantic coast and forest region. Buffalo meat,—fresh, smoked, dried, or converted into pemmican,—furnished a staple and often the sole article of food. The Indian made his moccasins of buffalo hide and slept between buffalo robes. The Mandan crossed the Missouri in a buffalo-hide canoe like the coracle of the ancient Briton. During the Indian summer, an Indian band gave itself up to a buffalo hunt. Mounted on his well trained pony, which he guided with his knees, the warrior dashed into a herd, racing along by the side of a selected animal until he had brought it down with bow and arrow, then along the side of another, until the plain was strewn with carcasses for the drudging squaws to recover.

Parkman's *Oregon Trail*, a book that every boy ought to read, gives an excellent account of the buffalo. Writing of the

Dakota Indians in 1847 when buffaloes yet grazed in large herds in Iowa and Minnesota, he says, "The buffalo supplies them with the necessaries of life, with habitations, food, clothing, beds, and fuel; strings for their bows, glue, thread, cordage, trail-ropes for their horses, coverings for their saddles, vessels to hold water, boats to cross streams, and the means of purchasing what they most need from the traders. When the buffalo are extinct, they too must dwindle away."

See AUROCHS; BUFFALO; CATTALO.

Bittern, a wading bird closely related to the heron. The common American bittern breeds from the central part of the United States northward, and passes the winter in the South Atlantic and Gulf states. Unlike the heron, it is a most unattractive bird. It is about twenty-eight inches in length, and has a slender, meager, buffy-brown, streaked appearance, hardly distinguishable from old grass. When alarmed it has a habit of standing in a sort of rigor, with its long bill held upright, like a dead weed. Even a practiced eye will pass it carelessly by for a clump of old weeds and grass. Long, loose, fluffy, drooping feathers about the neck and breast aid in deceiving the eye.

The bittern lives solitary in marshy places, picking up frogs and snakes which it prefers to mangle by threshing them on the ground before it swallows them. Three to five pale olive buff eggs are deposited in a grass-built nest amid the rushes of some marsh. The voice of the bittern is peculiar. Sometimes it sounds not unlike an old wooden pump out of order, from which the bird gets the name of "thunder pumper." Sometimes the call sounds surprisingly like that made by driving a stake with an ax, whence the name, "stake driver." A far less elegant but no less appropriate name is that of "shitepoke" given by Dutch settlers.

A smaller, darker colored bird, the least bittern, thirteen inches long, has a somewhat more southern summer and winter range. It has a soft voice. Its habits are similar to those of its larger relative. Pale bluish white eggs, three to six in a grassy nest among rushes or in a low bush.

Bitterroot, a plant native to the Northern United States and to Canada. It is a member of the dogbane family, and derives its name from its long, tapering, fleshy root, which, though bitter, is esteemed as an article of food by Indians and whites. The plant bears on its fleshy stem a single rose-colored blossom that remains open only in the sunshine. The bitterroot is the state flower of Montana and gave its name to Bitterroot Valley.

Bittersweet, a shrubby climber. It grows along streams and in thickets. It is related to the waahoo and the strawberry-bush. A profusion of orange colored berries, the size of peas, opens late in autumn, making a fine display of the scarlet coverings of the seeds. J. G. Holland has chosen *Bitter-Sweet* as the title of a poem in which he aims to teach that life contains a share of both elements.

Bitumen. See ASPHALT; PETROLEUM.

Björnson, byern'son, **Björnstjerne,** byern'sherne (1832-1910), a Norwegian poet, dramatist, and novelist. He was born at Kvikne. He was educated at the University of Christiania and became a writer for periodicals. He wrote powerful dramas and novels, but his stories of Norwegian peasant life, *Arne, A Happy Boy, The Fisher Maiden,* and *Synnöve Solbakken,* are known and loved more widely than any of his other works. In his later writings he showed himself "an advocate of extreme republicanism in politics and free thought in religion." *Bankruptcy, The King, The Glove, Beyond His Strength,* and *The Editor* may be mentioned among Björnson's dramas. *The Heritage of the Kurts* and *In God's Way* are later novels.

He is the greatest distinctively Norwegian writer of his day and his popularity among his countrymen is very great.—*Americana.*

Björnson shares with Ibsen the literary supremacy of Norway. The former is its hero and prophet as the latter is its judge.—Burton, *Literary Likings.*

With his death will pass away the last of that immortal trio, Ibsen, Grieg, and Björnson, who shed the luster of their genius on little Norway. With Björnson will come to an end the remarkable golden age of Norwegian culture. Not that Norwegian culture is dead. By no means. But its vikings, the men who sallied forth on the seas of cultural adventure, when the

national consciousness was beginning to wake after its long sleep, are gone.

Björnson is the last of the giants, and in some ways the greatest. To Norway, at any rate, he was the greatest, for he more than any other, was the personification of the nation, of its character, its aspirations, its ideals. Ibsen, the world knows better, because Ibsen, mighty Thor of Pessimism, hammered away at mankind in the mass, at human nature in its weakness, at the hopelessness of life because of that weakness. His hammer-strokes resounded around the globe. They appalled and fascinated the world.

Björnson was Ibsen's complete antithesis. He was ever the optimist, the hopeful, inspiring, fighting optimist. His gonfalon ever waved in the forefront of battle, but it was always Norway's battles and not the world's disputes that interested him most. He was first and foremost a patriot. After that he was a poet, a teller of folk tales, a writer of home plays, a red republican, a reformer.

He wrote the inspiring song poem, "Yes, We Love This Land," which bursts from Norwegian throats on every national occasion. Impulsive, generous, candid and obstinate, he was the Boy of Norway who never grew up. Up to that very dark day when disease laid him low, he was full of the joy of life, of the juvenile spirit of enjoyment. Around his peasant's house on the hillside at Aulestad floated the flags of all nations. It was a veritable shrine in these latter days to which journeyed many visitors to Norway. They found it more than a shrine —a patriarchal family, with the silver-haired, frank, impulsive Bear-Star, Son of Bear, at its head, and his motherly, faithful old wife at his side.—*Minneapolis Journal.*

Black, Adam (1784-1874), a Scottish bookseller and publisher. He was a native of Edinburgh. He began his business career as a bookseller. Later he took a nephew into partnership. He was an enterprising, intelligent man of large capacity and public spirit. The most noted publications of the firm were the *Encyclopedia Britannica,* and Scott's *Waverley Novels.* The successors of the original partners are still engaged in the publication of miscellaneous works and school books.

Black, William (1841-1898), a Scottish novelist. He was a native of Glasgow. He acquired his facility with the pen in writing for Glasgow newspapers and in reporting the Austro-Prussian War of 1866 for the London *Morning Star.* He wrote a large number of novels. The more noted are perhaps *A Daughter of Heth, The Strange Adventures of a Phaeton, A Princess of Thule, Madcap Violet, Macleod of Dare, White Wings,* and *In Far Lochaber.* His admirers would doubtless include others. The scene of several tales is laid in the extreme northern part of Scotland and in the western isles. Black is an interesting writer. His novels are well worth reading, but he is no such wizard as Sir Walter Scott. He describes wild scenery, the fishers, boats, and village life well; but his writing seems to be that of a summer tourist, rather than of one who has lived among the people. Whatever he may say of folk lore or of antiquities is the result apparently of information picked up carelessly. It is never a part of himself.

Black Arrow, The, a tale of the War of the Roses, a story of adventure by Robert Louis Stevenson, published in 1888. The tale is one of Stevenson's best. Sir Daniel Brackley, who shifts from one civil faction to another, as he may fancy is for his interest, compassed the death of his brother and held the guardianship of his young nephew Dick, that he might enjoy the lad's estate. The plot is one of greenwood, crossbow, and maiden-rescued-at-the-altar, quite in Robin Hood style. John Amend-All plays the part of Robin Hood. He and his men have a liking for young Dick, and an especial aversion for Sir Daniel and his followers. The retainers of Sir Daniel muster at the lichgate to march under his banner. They find a note pinned to the church door:

I had four blak arrows under my belt,
Four for the greefs that I have felt,
Four for the nomber of ill menne
That have oppressid me now and then.
One is gone; one is wele sped;
Old Apulyaird is ded.
One is for Maister Bennet Hatch,
That burned Grimstone, walls and thatch.
One for Sir Oliver Oates,
That cut Sir Harry Shelton's throat.
Sir Daniel, ye shull have the fourt;
We shall think it fair sport.
Ye shull each have your own part,
A blak arrow in each blak heart.
Get ye to your knees for to pray:
Ye are ded theeves, by yea and nay!
Jon Amend-All
of the Green Wood
And his jolly fellaweship.

Item, we have mo arrowes and goode hempen cord for others of your following.

See STEVENSON, ROBERT LOUIS.

Black Beauty, a story by Anna Sewall. Black Beauty is a horse, and his history is told in autobiographical form. The book has been read widely, and has been influential in securing kind treatment for horses. See ANGELL.

The circulation of *Black Beauty,* in all languages so far as I can estimate (1909), is approximately three million copies. It would be impossible to determine the exact number, as this book has been published by many different firms in many different places. I suppose Mr. Angell put out by far the larger number, probably over two million copies.—Guy Richardson, Editor, *Our Dumb Animals.*

Blackberry, a fruit-bearing bramble. The blackberry and the raspberry are nearly akin. The fruit of each is composed of a mass of drupelets, each containing a seed. The raspberry may be pulled off, leaving a dry receptacle or core. The blackberry core is juicy and forms part of the fruit. Blackberry preserves, jam, and jelly, wine and blackberry cordial, an old-fashioned family remedy, are not unknown on the housekeeper's shelves. Our blackberries are native Americans. The blackberry is comparatively unknown in Europe. It has reached its prominence in the United States during the past half century. Among hints given by growers are a well drained soil, protection from drouth, avoidance of over-rich soil which produces cane rather than fruit, and cutting out the old canes as soon as they have borne fruit. If the old canes be burned promptly, most of the blackberry's insect enemies are destroyed. In a cold climate blackberries must be covered in the winter season. The leading nine states in blackberry growing are as follows; the yield is in quarts for the year in which the fourteenth United States census was taken:

Texas	6,287,333
Washington	3,691,065
Missouri	2,985,006
California	2,549,082
Michigan	2,452,909
New Jersey	2,045,521
Oregon	2,139,110
Kentucky	1,778,468
New York	1,711,546

See RASPBERRY; BURBANK.

Blackbird, a well known member of a large bird family. It is related to the oriole, bobolink, and meadow-lark. The red-winged blackbird with scarlet shoulders and his rusty, buffy, modest wife build nests in the sedges, reeds, and rushes a foot or two above the water throughout the swamps of Eastern North America from the Gulf to Manitoba. Eggs, three to five, pale blue, streaked or spotted with dark purple. The spring concert of newly arrived blackbirds rivals that of the bullfrog. The *Kong Kĭ rēēē, conquerēē, conquerēē,* of a male balancing dexterously midway up an old reed or sitting on a willow is a cheerful trill of rich music. "The redwing flutes his *O Ka lee,*" says Emerson. The assaults of the blackbird on green corn, and a propensity not unlike that of the snipe to drill a hole at the base of sprouting corn for the sake of the seed, have not endeared him to the farmer. These birds gather in large flocks prior to their migration southward for the winter. The yellow-headed blackbird nests in extensive bodies of reeds from Illinois to Manitoba and westward. The rusty blackbird ranges farther north The purple grackle, or crow blackbird, breeds in the Mississippi Valley and eastward. The blackbirds of Europe and Africa do not belong to the same family as ours They are thrushes. The "wild whistling blackbird," named by Burns in his sorrow, belongs to a British family of thrushes. See COW-BIRD; BIRD.

Red-winged blackbird.

Blackcock, a northern grouse of the Old World. It is closely allied to our partridge and prairie hen. It lives on leaves, buds, and berries in the mosses of northern Britain, Scandinavia, Russia, and Siberia. The male weighs about four pounds and is of a bluish-black color. The female is gray and weighs half as much. Large numbers of the males are brought to the London market, the female being left by common consent to breed unmolested. The handsome male, with a scarlet patch over his eye, and a call likened to the whetting of a scythe, is the bird of which Scott, with Ellen's Isle in mind, says, "At noon the blackcock trims his jetty wing." See GROUSE.

Black Death, an infectious, oriental fever, accompanied by boils and black spots indicating decomposition. In England the pestilence broke out in the southern counties in 1348, or soon after the battle of Crecy, and raged for three years. Its ravages were not so severe in Ireland, and were much lighter in mountainous districts. It is thought that Scotland might have escaped had not the Scots taken advantage of the English distress to send a marauding army southward. This army was not only seized by the plague, but the survivors carried it home to the remote parts of the land. From England the death spread to Norway by ship. All countries of Europe were afflicted. It is stated on authority that 25,000,000 European people perished. In England the mortality was so great that agricultural districts suffered for laborers, and wages rose. Not only this, but English laborers, at that time little better than serfs, were able to make better terms with the ruling classes, and to lay the foundation for a long series of improvements in the social conditions of wage-earners.

Defoe gives a graphic description of a later outbreak in London in 1665, called the Great Plague, which carried off 63,596 people. A veritable reign of terror ensued. The inhabitants fled in every direction leaving thousands of unburied corpses to pollute the fever-stricken air. It is no wonder that the English Book of Common Prayer contains a petition to be preserved from pestilence. The Black Death is believed to have been the same as the modern Bubonic Plague, which see.

The most terrible plague which the world ever witnessed advanced at this juncture from the East, and after devastating Europe from the shores of the Mediterranean to the Baltic, swooped at the close of 1348 upon Britain. The traditions of its destructiveness, and the panic-struck words of the statutes which followed it, have been more than justified by modern research. Of the three or four millions who then formed the population of England, more than one-half were swept away in its repeated visitations. Its ravages were fiercest in the greater towns, where filthy and undrained streets afforded a constant haunt to leprosy and fever. In the burial-ground which the piety of Sir Walter Maunay purchased for the citizens of London, a spot whose site was afterwards marked by the Charter House, more than fifty thousand corpses are said to have been interred. Thousands of people perished at Norwich, while in Bristol the living were hardly able to bury the dead. But the Black Death fell on the villages almost as fiercely as on the towns. More than one-half of the priests of Yorkshire are known to have perished; in the diocese of Norwich two-thirds of the parishes changed their incumbents. The whole organization of labour was thrown out of gear. The scarcity of hands made it difficult for the minor tenants to perform the services due for their lands, and only a temporary abandonment of half the rent by the landowners induced the farmers to refrain from the abandonment of their farms. For a time cultivation became impossible. "The sheep and cattle strayed through the fields and corn," says a contemporary, "and there were none left who could drive them." Even when the first burst of panic was over, the sudden rise of wages consequent on the enormous diminution in the supply of free labour, though accompanied by a corresponding rise in the price of food, rudely disturbed the course of industrial employments; harvests rotted on the ground, and fields were left untilled, not merely from scarcity of hands, but from the strife which now for the first time revealed itself between capital and labour.—J. R. Green, *History of the English People.*

Black Douglas, The, Sir James Douglas, a character in Scott's *Castle Dangerous,* a story of the series, *The Tales of My Landlord.* Black Douglas was a generic name given to the elder branch of the noble Scottish family of Douglas. The scene of the story is Scotland, the time the fourteenth century, while Edward I of England and Bruce of Scotland are at war. The plot is concerned largely with the efforts of the Black Douglas to win

back his castle from the English. See DOUGLAS.

Blackfeet, a tribe of Indians. This tribe hunted the buffalo in the vast region extending from the valley of the Yellowstone to Hudson Bay. The Blackfoot was the most northwesterly representative of the great Algonquin family. Their warriors were related, therefore, in a remote way to Pocahontas, King Philip, Tecumseh, and Black Hawk. About 3,000 of these Indians linger on a reservation in Montana. As many more make their home in Canada. The name is said, rather fancifully it would seem, to have originated in the accidental circumstance that the first members of the tribe seen by white men had blackened their leggings by traveling across a burnt prairie.

The tribe that wandered the furthest from the primitive home of the stock (the Algonquin) were the Blackfeet, or Sisika, which word has this signification. It is derived from their earlier habitat in the valley of the Red River of the North where the soil was dark and blackened their moccasins. . . . They have an interesting mythology and an unusual knowledge of the constellations.—D. G. Brinton, *The American Race.*

Black Forest, a mountainous forest region about the head waters of the Rhine and the Danube. The name is a translation of the German Schwarz-wald. The region is from fifteen to thirty miles in width. It lies in Baden and Würtemberg. The forest growth is chiefly of pine. Agriculture is confined to the plains. Cattle are raised on the hillsides. A large part of the region is given up to the raising of timber for which it is famous. Large rafts of logs are taken down the Rhine and marketed in Holland. The region is noted for a number of local industries, such as the making of tar, charcoal, and potash, but especially for the manufacture of watches, cuckoo clocks, and toys. The latter are made more cheaply here than elsewhere, and are exported to all parts of the world. A part of the cheap wooden toys sold in American shops are from the Black Forest. Under the caption *"A Black Forest Pathway"* an entertaining article on the Black Forest is to be had in *Scribner's Magazine* for August, 1909.

Blackfriars, in the history of London, a name given to the mendicant monks of the Dominican order. These monks were so called from the color of their garb. They settled in Holborn, London, about 1221. In 1285 an old tower was given them for a monastery. When the older city walls were torn down, a large space thus cleared was given to the Black Friars. The monastery grew to be an extensive affair and played no small part in London affairs. It had the privilege of asylum; culprits who sought shelter within its precincts were secure from pursuit, unless handed over to the officers by authority of the monks. Henry VIII's suit for divorce against Catharine of Aragon was heard by Cardinal Wolsey and his colleague at Blackfriars. The old monastery disappeared long ago, but the name has been retained by the locality in which it formerly stood and by Blackfriars Bridge.

Blackfriars Bridge, a bridge across the Thames, London. The structure is built of iron. The bridge consists of five iron arches resting on granite piers. The central arch has a span of 185 feet. The bridge is 1,272 feet long and 80 feet broad. It was completed in 1869 at a cost of $1,600,000. Blackfriars commands a magnificent view of the shipping in the Thames. The dome of St. Paul's is seen to best advantage here. The present bridge occupies the site of an older bridge, known by the same name. The first Blackfriars Bridge was a stone structure. It was begun in 1760, and was finished in 1769. It cost $1,500,000. It was 995 feet long, 42 feet wide, and 62 feet above the water with a central span of 100 feet. About 1864 the stone pillars suddenly began to give way, rendering the bridge unsafe, and it was torn down. The diminished length of the new bridge may be accounted for in part by the building of Victoria Embankment. The northern end of the new bridge terminates at a massive stone wall. The space between this wall and the old river bank has been filled in with earth, and converted into solid land.

Blackfriars Theater, a famous London theater. The site is now occupied in part by the *London Times* office. Originally

the theater was built on territory belonging to Blackfriars monastery. The reason for this is a curious one. The monastery possessed the right of asylum. Players were forbidden to act in London, so they built their theater here on protected territory, where the sheriff of London had no authority. Blackfriars was never a low theater. The players were men of standing. "The actors of Blackfriars were of grave and sober behavior and men of high standing." Shakespeare and his friends acted here. Shakespeare wrote all his plays for either the Globe Theater or for Blackfriars. The theater is described as having boxes with three tiers of galleries above them. The orchestra sat at the side of the stage in the balcony. The stage was strewn with rushes, and, if a tragedy was to be represented, it was draped with black. Blackfriars was burned down about 1655.

Black Friday, the name given to the day of the gold panic September 24, 1869, on which immense fortunes changed hands. The true cause of the panic has never been explained satisfactorily but it is considered a result of an attempt made by Jay Gould and James Fisk to "corner" the gold market. See GOULD, JAY.

Black Hawk (1767-1838), a celebrated chief of the Sac Indians. His tribe lived at Kaskaskia, Illinois. He was made chief of the Sacs in 1788. He objected always to the cession of their lands, claiming that the chiefs were placed under the influence of whiskey before they signed the treaty. He was ordered to remove with his people to Iowa, but he lingered and inaugurated the so-called Black Hawk War in 1831. He stirred up the Indians of Iowa and Wisconsin, with a view to regain their old hunting grounds in Illinois. In the war that followed, Abraham Lincoln was among the volunteers. In August, 1832, Black Hawk and his braves were defeated at the battle of Bad Axe River, and Black Hawk was taken prisoner. He was taken to Washington, and conducted through the chief cities of the East to impress him with a sense of the folly of opposing the whites. He was subsequently released, and lived with his tribe near Fort Dodge, Iowa.

Black Hills, a rough region in southwestern South Dakota and Wyoming. In pioneer days it was a stronghold of the Sioux Indians. The region was opened to settlement in 1876. The Black Hills are noted for mining. Gold, silver, copper, lead, iron, and other ores are produced. The Homestake Mine is the most productive gold mine in North America. There are caves of unknown extent. Grazing is an important industry. See SOUTH DAKOTA.

Black Hole of Calcutta, a dungeon in Fort Williams, Calcutta. During an insurrection of the natives, the English garrison of this fort, then a trading station, were taken captive by the nabob, Dowlah. On the evening of June 20, 1756, 146 prisoners were crowded for safe keeping into the little dungeon of the place only twenty feet square. The room was so crowded that the door could only be closed with difficulty. The room had but two small windows. In that warm climate, the men were in a few moments in a violent perspiration, and began to call loudly for air. The native keepers, however, dared not awaken the nabob, who had gone to sleep. The prisoners raved and cursed, and fought for a position near the little barred windows. They offered the guards large sums of money to exert themselves to secure larger quarters, but the poor Hindu guards were powerless. They tried to pass in water through the windows, but the amount was so small and the men were so frantic that it was spilled without doing much good. In the morning but twenty-three men were taken out of the Black Hole alive. The nabob appeared utterly unconcerned. It is a little satisfaction to know that he was murdered a few months later by a political rival. For an account of the Black Hole atrocity by a master of description, the reader is referred to Macaulay's *Essay on Lord Clive.* See INDIA; CLIVE; LUCKNOW.

Blackmail, a term applied in the days of English and Scotch border warfare to payment made in cattle, corn, or the like, to some chief of robbers for protection

from further loss. Scott's *Waverley* gives a glimpse of the efficient protection afforded by a Fergus McIvor, and the prompt loss of flocks following neglect and refusal to pay blackmail. Farmers in the border country had no choice save that between submission and ruin. In modern usage the term is applied usually to a sum of money extracted from a person through threats of exposure of wrongdoing. "Give me of your flocks or you shall lose" was the message of the Scottish border chieftain. "Give of your money or I'll tell" is the formula of the modern blackmailer. The laws of most states make the levying of blackmail a crime punishable by imprisonment for a term, usually not to exceed five years.

Blackmore, Richard Doddridge (1825-1900), an English novelist. He was a native of Berkshire and was educated for the law, but took to writing tales of English life. His one success is *Lorna Doone,* published in 1869. It is a story of an English farmstead and a band of robber Doones. Lorna is the heroine. It ranks certainly among the best of English novels. Of a score of volumes written by the same author *Clara Vaughan* and *Alice Lorraine* may be mentioned, but the best of these is not to be compared with *Lorna Doone.*

Black Prince, Edward (1330-1376), Prince of Wales, the son and heir of Edward III of England. He was a noted knight. His name was derived from the color of his armor. At the age of sixteen, he was in the thick of the battle of Crecy. Ten years later he defeated the French at the battle of Poitiers. He was one of England's greatest fighting men. He slew the king of Bohemia in battle and took prisoner the king of France and the king of Scotland. He died before his father, but his son became King Richard II. The motto of the Prince of Wales, *Ich dien* (I serve), was won at Crecy. It has been retained by his successors ever since.

Black Sea, a large inland sea situated between Asia Minor and Russia. By the ancients it was called the Euxine. It is entered from the Mediterranean by way of the Dardanelles, the Sea of Marmora, and the Bosporus. Its drainage basin is large. It receives the waters of about one-fourth of Europe and not less than 100,000 square miles in Asia. Considerable portions of the Russian shore are low and sandy, especially about the mouths of the European rivers, but the Asiatic coast, as well as the Crimea, is high and rocky. The greatest length is 750 miles. The sea is subject to violent storms. The northern shore is icebound in January and February. The Black Sea is 7,000 feet deep, and is unfavorable for fish, though sturgeon and other fish are taken near the mouths of the rivers. The Mediterranean tunny comes in to spawn. Dolphins and porpoises are numerous in the harbors. The waters of the Black Sea are open to the merchant ships of all nations, but warships are not allowed to pass the Bosporus. This rule was made by the great powers in order that the warships of Russia may not pass out and attack Constantinople. Odessa, famous for wheat, is the leading seaport. Caviare, fish glue, and oil are exported. Batoum is noted for exports of Baku petroleum. The American Standard Oil Company is interested. See TURKEY; CONSTANTINOPLE; CRIMEA.

Blacksnake, or **Blue Racer,** a harmless serpent native to the Eastern United States from Florida to Canada. The adults are usually lustrous black above and slate color beneath; they are very slender in form and rarely attain a length of more than six feet. The blacksnake is the swiftest and most indefatigable hunter among all American snakes. It is an expert climber, going into the very tops of trees in search of birds' nests, and often leaping more than its own length to get from one tree to another. It is an expert swimmer, and hunts the marshes for frogs and toads, small snakes of other species, small mammals, and birds and their eggs. The blacksnake is useful to man as a destroyer of many insects, and moles and mice, and is at the same time harmless, its most severe bite leaving only a scratch. The stories of blacksnakes that track and kill rattlesnakes are—stories. This reptile is courageous, but will always flee when closely

approached by man. The skunk and the badger are perhaps its worst enemies. It hides in hollow stumps and underground.

Blackstone, Sir William (1723-1780), an English jurist. He was born in London and was educated at a London school called Charterhouse, at Oxford University, and later for the law. In 1758 he began a series of lectures at Oxford on English law. He divided his comments into four books on the rights of persons, the rights of things, public wrongs, and private wrongs. Published in book form these lectures are known as Blackstone's *Commentaries* and are frequently, if not universally, the first law book placed in the hands of a law student. Blackstone is criticized for being too much of an essayist and not enough of a lawyer; for not distinguishing clearly between legal and popular uses of a word; for falling into contradiction; and for setting up a literary defense of English law as a perfect and perfected body of law, instead of a crude, growing code full of injustice as well as of admirable provisions. Lawyers regard Blackstone rather as an essayist,—a Lord Macaulay turned loose in a law school.

Bladder-Nut, a shrub ten feet high, with greenish striped branches. It is related to the box-elder and to the maples. So called from a three-celled, inflated pod, looking something like the husk of a ground cherry. There are from one to four seeds in each cell. They rattle in a pod which hangs on all winter.

Bladderwort, a curious aquatic herb floating or rooting in the mud. The thread-like leaves are furnished with air bladders which float the plant, especially at time of flowering. An interesting feature is a light, thin, trapdoor opening inward on the underside of the bladders. The probability is that this door is designed to admit water when the plant is ready to sink, but insects push up through the trap and are unable to escape. The question is whether the plant makes use of them for food. The yellow flower of the common bladderwort *(utricularia vulgaris)* has a chin-like spur and an irregular sort of hood. It grins at one from ponds and ditches like a tiny old water witch.

Blaine, James Gillespie (1830-1893), an American statesman. He was born in Pennsylvania near Pittsburg. His father was a Scotch-Irish Presbyterian; his mother a Catholic. As a lad he had strong likings for debate, literature, and history. He was educated at Washington College. He studied law, and later opened an office in Augusta, Maine. His facility in public speaking drew him into journalism and politics at once. He was a member of the convention of 1856 that nominated Frémont for the presidency. He served in the state legislature and represented Maine in Congress for twenty years. He was speaker of the House from 1869-1874, and won a reputation for ability and dispatch of business, second only to that of Thomas B. Reed in later times. In 1876 Blaine was a candidate for the presidential nomination, but was defeated by Hayes. He opposed the appointment of the electoral commission on the ground that it extended the powers of Congress. In 1880 he was again a candidate, but was defeated by the forces of Roscoe Conkling, his political enemy. The prize went to Garfield who made Blaine secretary of state. Upon the assassination of President Garfield, Vice-President Arthur, a political ally of Conkling, became president and Blaine resigned. In 1884 he was again a candidate for the Republican nomination. This time he won in the convention. Despite the facts of Blaine's parentage and that he himself was decidedly noncommittal in denominational matters, a blundering clergyman in New York state made the assertion in a congratulatory address that a vote against Blaine was a vote for "Rum, Romanism, and Rebellion." This cry was taken up by political opponents, and it is claimed carried the state by a small margin for Cleveland, insuring the latter's election to the presidency. Andrew D. White maintains that the state was lost to Blaine anyhow, and that the oft told tale of how Blaine lost New York and the presidency is without sound foundation. During Blaine's long public career, he was a staunch supporter

of the Union cause. He favored bimetalism, that is to say, the circulation of gold and silver on an equal basis. He advocated paying bounties to the builders of American ships and labored for reciprocity, or an exchange of goods between neighboring countries without the payment of prohibitive duties. During his service as speaker of the House he was accused of having a financial interest in government contracts. The charge was not proved, but it hurt his standing in political life. In point of eminence, ability, and political disappointment he may be mentioned in connection with Webster, Clay, Seward, and Douglas. Blaine's later years were spent in preparing his work, *Twenty Years in Congress.*

Blair, Francis Preston (1791 - 1876), an American journalist and politician, born in Abingdon, Va. After graduating from Transylvania University in 1811 he entered politics. He supported Henry Clay for the Presidency in 1824, but later became a warm adherent of Andrew Jackson. Blair was editor of the *Washington Globe* from 1830 to 1845. He was a strong opponent of slavery and a whole-souled supporter of Lincoln, and was one of the founders of the Republican party, but later he returned to the Democratic fold. In 1864 he unofficially proposed peace terms to Jefferson Davis, which resulted in the famous peace conference between President Lincoln and the Confederate representatives, held at Hampton Roads, February 3, 1865.

Blair, Francis Preston, Jr., (1821 - 1875), an American lawyer, soldier and politician, son of Francis P. Blair, Sr., was born in Lexington, Ky. He was admitted to the bar in 1843 and practiced law in St. Louis. He served as a private in the Mexican War. Blair was for a time editor of the Missouri Democrat. At the outbreak of the Civil War he was the leader of the Union party in Missouri, and to him was in a great measure due Missouri's remaining in the Union. He was unsuccessful candidate for Vice President in 1868, and from 1871 to 1873 was a member of the United States Senate.

Blair, James (1656-1743), a colonial clergyman and educator, the founder and first president of the College of William and Mary in Virginia. He was born in Scotland and studied at the University of Edinburgh. In 1682 he went to Virginia as a missionary of the Church of England. He preached, successively, at Henrico City, Jamestown, and Williamsburg, and in 1689 became Commissary of Virginia. In 1690 he began the work of founding a college in Virginia, which was to provide for the education of young men as ministers. He went to England in 1691, and there in 1693 secured a charter for the College of William and Mary. The buildings for the college were erected and he became its president, which position he held until his death in 1743.

Blair, Montgomery (1813-1883), an American lawyer and statesman, son of Francis Preston Blair, Sr. He was born in Franklin Co., Kentucky, and graduated from West Point in 1865, after which he served for some months in the first Seminole War. He resigned from the army, studied law, and was admitted to the bar, practicing in St. Louis. He held many important public positions, and was Postmaster-General in President Lincoln's cabinet from 1861 to 1864. He returned later to the Democratic party, and was a warm supporter of Tilden in the Tilden-Hayes controversy. He published his *Speech on the Causes of Rebellion* in 1864.

Blake, Edward (1833-1912), a Canadian statesman. He was born at Adelaide, Ontario, and was educated at Upper Canada College and Toronto University. Admitted to the bar in 1856, he soon took an active interest in political affairs. In 1867 Mr. Blake was elected to the Dominion Parliament, and at the same time sat in the Ontario Legislature. In 1869, he became the leader of the Liberal Opposition in the Legislature, and in 1871 was Prime Minister for several months. Declining the leadership of the Liberals in Parliament, he accepted a ministership without portfolio in 1873. In that year Mr. Blake took a prominent part in opposing the political bargain known as the Pacific Railway Scandal. Accepting the office of Minister of Justice in 1875, he

aided in planning the organization of the Dominion Supreme Court. He was leader of the Liberal opposition in the Dominion House of Commons from 1880 to 1887, and in 1891 retired from Canadian political life. At the invitation of the Irish Nationalists, Mr. Blake entered Imperial politics in 1892. He was elected to the British House of Commons and rendered excellent service to the Nationalists. In 1896, he was a member of the committee appointed to investigate South African affairs. An ardent advocate of Imperial federation early in his career, Mr. Blake later became more conservative in his views. He took an active interest in educational matters and founded several scholarships at Toronto University, of which he was chancellor for a time.

Blake, Robert (1598-1657), a famous English seaman. He was a native of Somersetshire. His father was a merchant. Robert was well educated. He entered Parliament as a Presbyterian, and took an active part in the conflict with the Royalists. His life began and ended within a few months of that of Cromwell, and their lives ran parallel. When Parliament and the king came to blows, Blake proved his mettle at the head of a troop of his neighbors, and shortly after the execution of Charles I he was appointed General of the Sea. He drove Prince Rupert and the royalist fleet into port in Portugal, captured a fleet of seventeen richly laden Portuguese ships returning from Brazil, destroyed the fleet of Rupert, and fought the Dutch under Van Tromp, De Witt, and De Ruyter. Though Van Tromp lashed a broom to his masthead to indicate his intention of sweeping the English from the sea, the British schoolboy reads in history a glorious story of a Dutch fleet of a hundred ships annihilated, and a Spanish fleet cut out under the guns of a castle on Teneriffe. Blake reduced the Knights of Malta and the piratical states of North Africa, and forced them to respect the flag of the English merchantman. He died at sea in sight of Plymouth, and was buried with honors in Westminster Abbey. His bones were ordered removed by Charles II. In a time of bitter hatreds Blake was an open fighter. He has never been accused of persecution, dishonesty, or unmanly actions in private life.

Blake, William (1757-1827), an English poet, artist, and engraver. This poet-artist, whose illuminated poems are a unique work, is one of the most interesting and perhaps the least understood of all who figure in the pages of literature. Called a connoisseur in his childhood, called a child in his old age, he was a mystic who saw visions of angels where others saw flowers and trees; who claimed to talk with men of a bygone age—with Moses, Virgil, and Homer—and who was accounted insane because he wrote poetry like an artist, letting symbols take the place of ideas. He died in poverty and obscurity, and now his drawings and engravings sell for thousands of dollars.

Blake was born in London. His father kept a hosier's shop. While he gave his boy but a scanty education, he seems to have recognized the child's artistic ability at an early date and to have done his best to encourage and develop it. At the age of ten young William was sent to a drawing school, where he received instruction for four years. Already he was haunting art sale rooms, where he became known as the "little connoisseur." After four years at drawing school, Blake was apprenticed to James Basine, a prominent engraver. Here he remained for seven years, becoming proficient in the art of engraving. On completing his apprenticeship Blake began to engrave for the booksellers, at the same time continuing his art studies at the Royal Academy. Blake married in 1782. About this time he began to see something of literary society. In certain circles it became a common thing for him to recite or sing poems of his own composition. In 1783, at the suggestion of friends, he published *Poetical Sketches,* a volume of boyish, but rather promising poems. In 1789 *Songs of Innocence* appeared, followed in a few years by a companion volume, *Songs of Experience.* These books were produced by an original method which Blake believed to have been revealed to him in a dream by

his dead brother. He engraved the poem, together with a decorative design, upon copper. The pages printed from these copper plates were afterward colored by hand, his wife aiding him in the work. Many of the songs in these volumes rank among the best poems of the romantic school of which Swinburne calls Blake the founder. Between these two volumes of verse intervened several *Prophetic Books,* as Blake called them. These "prophecies" are obscure, and often incoherent. It is on account of the unintelligibility of these poems that Blake came to be regarded as insane. He seems to have been under influences for which no outward facts can account. But whether he was a prey to a disordered fancy, or whether, as his ideas became more profound and complex, he lacked ability to express them in logical language, has never been clearly settled. However this may be, the artist's power increased as the poet's ability to write acceptably decreased. His *Inventions to the Book of Job,* consisting of twenty-two engravings and twenty-one original designs in color, with the original colored drawings by the artist, sold in London in 1903 for $28,000. Illustrations for Thornton's *Virgil,* for Young's *Night Thoughts,* for the *Divina Commedia,* and for *L'Allegro* and *Il Penseroso* are among his other works. For twenty-eight years Blake sent pictures to the annual exhibition of the Royal Academy. His paintings are usually weird in subject. The procession of the Canterbury pilgrims is one of the most widely known.

I assert for myself that I do not behold the outward creation, and that to me it is hindrance and not action. "What!" it will be questioned, "when the sun rises, do you not see a disk of fire, somewhat like a guinea?" "O no, no! I see an innumerable company of the heavenly host, crying 'holy, holy, holy, is the Lord God Almighty!'" I question not the corporeal eye, any more than I would question a window concerning a sight. I look through, and not with it!

Tiger, tiger, burning bright
In the forests of the night,
What immortal hand or eye
Could frame thy fearful symmetry?

A Robin Redbreast in a cage
Puts all heaven in a rage.

Tools were made, and born were hands
Every farmer understands.

A truth that's told with bad intent
Beats all the lies you can invent.

SAID OF BLAKE.

Blake, that sublime visionary.—Edmund Clarence Stedman.

One of the most extraordinary persons of the age.—Charles Lamb.

It is by the sublimity of his genius, and not by any mental defect, that Blake is most clearly distinguished from his fellows.—J. W. Comyns Carr.

Blanc, Louis (1811-1882), a French socialist. He was born at Madrid. He studied at the University of Paris, and took up the work of an attorney's clerk; but wearying of that life, taught for a time and then turned his attention to journalism. He founded the *Revue du Progres* in 1839 and devoted his energies to the interests of the workingman. His great work, *Organization of Labor,* appeared serially in the *Revue,* and was published in book form in 1840. He attacked the government of Louis Philippe bitterly. He was a member of the provisional government of 1848. He was accused of conspiracy and fled to England, where he wrote a *History of the French Revolution* in twelve volumes, *Letters on England, Questions of Today and Tomorrow.* At the downfall of Louis Napoleon in 1870 Blanc returned to Paris. His socialistic admirers elected him to the National Assembly. Louis Blanc had no little influence on the thought of his day. He is quoted frequently. His central doctrine may be stated briefly. Society should cease to be a battlefield, man competing with man. Each should contribute according to his ability and each should be compensated according to his needs.

Blanc, Mont, the highest and in many respects the most remarkable mountain in Europe. Its chief summit is 15,781 feet above the sea. Geographically Mont Blanc is a part of Switzerland, but on the political map, the greater part of the mountain, including its chief summit, is in France. It was ascended in 1786 by Jacques Balmat, whose monument stands in the village of Chamounix. A scientific exploration under the celebrated Saussure

ascended in 1787 and took many observations. At the present time the business of making ascents is so thoroughly systematized by the guides of Chamounix that the trip may be made without serious danger. A rude inn, or sort of camping place and depot of provisions, has been established near the summit. The first day is spent in reaching this chalet; the second in completing the ascent and viewing the surrounding country if the air be clear. The party returns to camp at night and to Chamounix on the third day. The entire cost of the trip, including the charges for guides and entertainment at the inn, is about $75. In trips of this sort, one guide goes ahead, another brings up the rear. They carry the ends of a long rope, to which the tourists are required to fasten themselves as a precaution lest they slip from the footpath into the snowy chasms along which it is necessary for the party to thread its way. A rack and pinion railroad was begun in 1906. See ALPS; SWITZERLAND; CHAMOUNI.

Mont Blanc is the monarch of mountains;
They crowned him long ago
On a throne of rocks, in a robe of clouds,
With a diadem of snow.
—Byron, *Manfred.*

Blanket, a heavy, oblong piece of cotton or woolen cloth, loosely woven and finished with a nap. Bed blankets, for four hundred fifty years preceding the last half of the nineteenth century, were made of wool, either in white or natural gray. Since that time the use of cotton blankets and blankets of mixed cotton and wool has increased constantly. The manufacture of bed blankets involves but four processes, weaving, fulling, napping, and binding.

Bland, Richard Parks (1835 - 1899), an American legislator, was born near Hartford, Ky. He emigrated to Missouri, thence to California, and from there to Utah Territory. He was admitted to the bar in Utah Territory, but returned to Missouri to practice. In 1872, Mr. Bland was elected to the National House of Representatives, where, with the exception of the period between 1895 and 1897, he served until his death. Mr. Bland became prominent through his connection with the Bland-Allison bill, which provided for the coinage of a specified amount of silver bullion each month. This bill was passed over the veto of President Hayes, and continued in force until repealed by the passage of the Sherman Law in 1890.

Blank Verse, unrhymed verse. In English poetry this form of verse was used first by Henry Howard, Early of Surrey, a writer of the first half of the sixteenth century. At that time everything classical was admired and imitated, and as the classic poets of Greece and Rome had written in unrhymed lines, it was natural that writers in modern languages should do the same. Howard translated two books of Virgil's Aeneid into English blank verse. Since that time it has been used by many poets and adapted to all classes of poetry except the lyric and the simpler forms of the epic, such as the ballad. The most common form of blank verse is the iambic pentameter, that is, each verse consists of five feet, each foot of an accented syllable followed by an unaccented syllable. In this metre are written all our great epics and dramas. It is called often "dramatic verse," "heroic pentameter," "Shakespearean verse" and even "blank verse" simply is used to designate this form. The reason for blank verse in epic and dramatic poetry is clear. Unhampered by necessity of rhyming, the poet has more of freedom and may represent his characters as speaking in language more nearly like that of everyday life, while on the other hand the metrical form is more beautiful and pleasing than would be plain prose. The origin of the term "blank verse" is attributed to Shakespeare in *Hamlet,* Act II, Scene 2, where Hamlet says, "And the lady shall say her mind freely, or the blank verse shall halt-for't." Longfellow's *Hiawatha* and the same poet's *Evangeline* give examples of blank verse in metres differing from the iambic pentameter, and are interesting by way of comparison. See POETRY; HOWARD, HENRY.

Blarney, a village four miles northwest of Cork, Ireland. The name is applied also to a stream, and to a small castle in the vicinity. The inhabitants of this parish are said to be particularly versatile

in the art of flattery and persuasive speech, which is accordingly called blarney from the name of the locality. A stone in the northeast angle of the castle, several feet from the top, bears a Latin inscription giving the date of erection. It is called the Blarney Stone. Whoever kisses the Blarney Stone is said to acquire the fluency of tongue peculiar to the district. The term has passed into literature. See IRELAND.

Blashfield, Edwin Howland (1848-), ar American artist. He was born in New York City, but was sent to Paris to study art. He worked there ten years. His specialty is decorative painting on a large scale. Specially noteworthy paintings are *The Angel with the Flaming Sword, A Poet, The Fencing Lesson, Christmas Bells.* The decorations of a dome in the Manufacturers Building at the Columbian Exposition, and of the dome of the Congressional Library at Washington, decorative work in the Appellate Court of New York, ceilings and canvases in many of New York's finest homes, may be mentioned among his efforts.

Blast Furnace. See IRON.

Blasting, the process of removing obstructions by the use of explosives. Quarrymen save themselves labor by drilling holes and filling them partially with charges of powder. One end of a piece of fuse is placed in the powder and the hole is filled up to the surface with loose sand or with scraps of rock tamped down solid. The free end of the fuse is then fired and the quarryman retires to a safe position, which he is able to do before the fire reaches the powder. The sudden explosion throws off a mass of rock, doing work that would otherwise cost days of labor. In lieu of a fuse electric circuits may be employed. The ends of the wires are separated slightly; in leaping the gap the spark ignites the powder. A number of charges may be ignited at the same instant in this way, cracking off long strips of rock as neatly as though done with a saw. Nitro-glycerin and gun cotton are too dangerous, but dynamite or silicious earth, saturated with nitro-glycerin, may be used for the purpose. In 1843 three dynamite charges of 6,000 pounds each were fired simultaneously to blow up a portion of the Dover cliff required in the construction of a breakwater. Miners employ dynamite in loosening ore and coal, and in digging tunnels. Farmers put a cartridge of dynamite under a stump to throw it out of the ground. A dangerous reef known as Hell Gate, in the East River between New York City and Long Island, was removed by charging twenty tunnels with over twenty-five tons of dynamite and powder. Several million tons of rock that had long been a menace to shipping were thrown out in a single explosion. During the siege of Port Arthur by the Japanese immense blasts of dynamite were used that literally tore the faces off the mountains, and rendered expensive fortifications worthless. See DYNAMITE.

Blavatsky, blä-vät′skĭ, **Helena Petrovna Hahn** (1831-1891), a Russian theosophist. She was born at Yekaterinoslav. Early in life she married a Russian councillor of state, but was soon separated from him. Madame Blavatsky was fond of travel, and while in Tibet became interested in the religions and mysteries of the east. She studied Buddhism, Brahmanism, the Cabala, Oriental Spiritualism, the worship of Isis and probably the methods of the dervishes, or East Indian jugglers. In 1873 she came to New York and began to spread abroad the ideas with which she had become imbued, claiming to have received knowledge of God and of spiritual matters by some specially illuminating process while in the East. In 1875 she organized in New York the "Theosophical Society." Her doctrines found many followers, and seem to be still gaining ground. Madame Blavatsky was the author of many books. *Isis Unveiled* is her most important work and is the text-book of her followers. Other writings are *The Key of Theosophy, The Secret Doctrine, The Voice of Silence.*

Branch societies were founded in other countries. *The Theosophist,* a periodical first issued in 1879, became the official organ of the society. It was published at Bombay. Madame Blavatsky won many followers through her lectures and her

writings, and also through her so-called miracles. Investigations by the Society of Psychical Research in 1884, and by V. S. Solovyoff, who published in 1895 *A Modern Priestess of Isis,* demonstrated the fraudulent nature of these miracles.

Bleaching, the process of whitening, or removing the natural greyish or yellowish color from new linen, silk, cotton cloth, chip hats, nuts, etc. It is the opposite of dyeing. The Egyptians appear to have employed a method of bleaching by means of weak lye. The method of bleaching corresponding in age to the historic hand loom is the simple one of dipping a web of cloth in water, or else sprinkling it with water and spreading it out on a grass plot to dry. Dew was supposed to be particularly serviceable. This process of sprinkling and drying was kept up sometimes for weeks to obtain the desired degree of whiteness.

Linen holds its vegetable yellow more tenaciously than cotton, but it is exquisitely white at the last. Under the impression that the waters or else the climate of Haarlem were especially suited, British linen, particularly Scotch linen, was long sent to Holland for bleaching. It was retained for a year or so and was known in the trade as Hollands.

The old picturesque methods of the hand loom and grassy bleaching plot have given way in most places to bleaching in large factories by a chemical agent. Grass bleaching, or "crofting" as it is called technically, is still practiced extensively in both Scotland and Ireland. The process includes a number of boilings, rubbings, and lye baths, besides the actual exposure of the fabric to sun and air. Thirty-one days are required for crofting linen. Many housekeepers still prefer to buy unbleached sheeting and trust to repeated launderings to make the cloth white, claiming that the cloth is stronger than that bleached by modern chemical methods.

The details of the modern bleaching processes are chiefly those of steaming, steeping, boiling, and washing in chlorine water and other lye and cleansing waters. The webs of cloth are sewed together in one continuous piece measuring from 300 to 1,000 yards in length. This cloth is drawn through the various solutions by the action of rollers on which it is wound.

Chlorine is prepared for use by introducing chlorine gas into a chamber, the floor of which is covered with pure slaked lime. By dint of occasional stirring the lime absorbs over half of its own weight of chlorine. Large factories at Niagara Falls are employed in the production of this chloride of lime, or bleaching powder for use in linen and cotton mills.

If either cotton or linen is to be printed, it must be bleached until chemically pure, or the action of the coloring matter may be interfered with. This is called "print-bleaching." If it is to remain plain white, it need be bleached only until it satisfies the eye. This is "white bleaching."

Wool and silk are bleached with sulphur. The goods are hung in the upper part of a close room called a "sulphur stove," and subjected to the fumes of burning sulphur. The natural coloring matter is not destroyed by this process, but the sulphur combines with the coloring matter to produce a colorless compound. If wool or silk fabric bleached by this process is subjected to several washings with soap containing potash, this colorless compound is destroyed and the natural yellowish color of the fiber reappears. This is why wool and silk are said to "grow yellow" by washing. See CHLORINE; SULPHUR.

Bleak House, a novel by Charles Dickens published in 1853. In this story the chief characters belong to a less humble stratum of society than those in most of Dickens' tales. Esther Summerson is the heroine of the story, and through a life of nobleness and loving self-sacrifice is led at last to happiness. As a sort of secondary theme, Dickens introduces the famous case of Jarndyce *vs.* Jarndyce, a satire on the Court of Chancery. His graphic pictures of the trouble and misfortune caused by long delays due to the complicated forms of procedure in this court are said to have been influential in securing subsequent reforms in this department of English jurisprudence. Mrs. Jellyby, neglecting her family that she may devote her time to Borrioboola-Gha and the "na-

tives;" Mr. Jarndyce, giving himself to kind deeds and complaining that "the wind is east;" Little Jo, always "movin' on;" Mr. Skimpole, refusing to understand anything connected with money; Grandfather Smallweed; Mr. Turveydrop; the unhappy Lady Dedlock,—these are the figures that *Bleak House* brings to mind. Many regard it as Dickens' best novel. He himself said, "In *Bleak House,* I have purposely dwelt upon the romantic side of familiar things."

Blende, an ore of zinc. See ZINC.

Blenheim, blĕn'ĭm, a village of Bavaria situated twenty-three miles northwest of Augsburg. Several important battles have taken place in its vicinity, the chief of which, known as the battle of Blenheim, occurred August 13, 1704. Marlborough and Prince Eugene, at the heads of the united forces of Holland, England, Austria, and the German Empire, won a notable victory over the forces of France and Bavaria. It is estimated that about 100,000 men were engaged, about evenly divided between the opposing sides. The French lost 10,000 killed and wounded; many were drowned in the Danube, and 13,000 were taken prisoners. In consequence of this victory the name Blenheim became popular in England. The government of Queen Anne rewarded Marlborough handsomely. A fine estate near Oxford was presented to him, and its name was changed to Blenheim Park. A magnificent palace, called Blenheim House, was erected on it at an expense of $3,000,000. The battle of Blenheim is the subject of a well known poem by Robert Southey, closing:

"And everybody praised the duke,
Who this great fight did win."
"But what good came of it at last?"
Quoth little Peterkin.
"Why, that I cannot tell," said he,
"But 'twas a famous victory."

See MARLBOROUGH.

Blennerhasset, Harman, an Anglo-American adventurer (1764-1831). He belonged to a wealthy, well educated, English family. Having married his own niece, he was ostracized by English society and driven to sell his estates. He migrated to America, and established a home on an island in the Ohio River a few miles below Parkersburg, West Virginia. His palace, grounds, pictures, and statuary were the admiration of all travelers. He entertained with lavish hospitality. Aaron Burr drew him into schemes for the establishment of an independent empire in the west. He invested a great sum in arms, ammunition, boats, and provisions. He was arrested on a charge of treason, but was discharged finally. His home, however, had, by this time, been ruined. His grounds had been turned into a hemp field, and his mansion used for a granary. He bought a cotton plantation on the lower Mississippi, but failed in this, as well as other commercial enterprises and returned finally to England. He died on the island of Guernsey. See BURR.

Bleriot, Louis, the first person to cross the English Channel by means of an aeroplane. See AIRSHIP.

Blight, a general term applied to any diseased condition of plants, which causes withering, decaying, or premature death of the plant, either as a whole or in part. It has been somewhat indiscriminately used to describe this result, whether due to fungous disease, insects, or insufficient food supply. More specifically, the word blight is used for a kind of mildew, varieties of it affecting fruits and vegetables most seriously, the more common being apple, pear, grape, tomato and potato blights.

Blindness, inability to see. Some children are blind from birth, others are blinded by accidents. Watchmakers not infrequently lose their eyesight from intense looking at small bits of wheelwork. Chemical fumes are injurious to the eyesight. Glassblowers and iron smelters frequently lose their sight, and in old age the humors of the eye are likely to dry up. The number of blind in the United States is about 50,568.

The sense of hearing is likely to be developed in the blind to a high degree. Many become skillful piano tuners, teachers of music, and organists in churches. They are obliged to rely on their other senses, so that the sense of touch becomes very acute. It becomes so fine in some

cases that they can detect counterfeit coin without hesitation. Many blind people find employment, also, in factories as makers of baskets, rope, twine, and matting. Special efforts have been made to educate the blind and to print books for their use. For a long time the plan of embossing or raising the surface of paper to imitate the shape of ordinary letters was followed. About a third of the blind become able to read raised print readily by following it across the page with the tips of the fingers.

Of late, the raised letter method has been abandoned, largely at least, in favor of a system of points pricked upward in the paper. Each sound has its particular point or points, which the finger can recognize more readily than the raised letter. The blind are able to write by pricking out their sentences on the wrong side of the paper. They take great satisfaction in exchanging letters of this sort. They keep their business accounts in the same manner. Typewriting machines have been made for the benefit of the blind with type that pricks holes in the paper.

The London library for the blind contains 8,000 volumes. An average volume in ordinary type makes from ten to fifteen bulky volumes in the Braille system. The Bible occupies thirty-five volumes. The library includes the most famous English novels, histories, and biographies.

In 1879 Congress set aside an appropriation of $250,000 to be invested in United States bonds, the income to be used annually in printing texts and miscellaneous books for the blind for free distribution to schools in the several states in proportion to their attendance. The catalogue of books thus available already includes the best literature, and standard works in every branch of science, history, and art.

The Maryland School for the Blind has issued a dictionary of 40,000 words in eighteen volumes. The blind have two or three point print periodicals of their own, and quite an extensive musical library. In printing point or braille, as it is called, the copy is first pricked in a sheet of brass. Any number of sheets of paper may be pricked by pressing them on the sheet of brass. Point printing or braille is largely the invention of Louis Braille, an ingenious blind Frenchman. The first ten figures used to represent the first ten letters of the alphabet, also the ten figures or digits of arithmetic, are as follows:

A	B	C	D	E	F	G	H	I	J
⠁	⠃	⠉	⠙	⠑	⠋	⠛	⠓	⠊	⠚
1	2	3	4	5	6	7	8	9	10

Braille is written by placing a strip of perforated tin on the paper. The tin is divided into small checks or squares each containing six holes in the form of ⠿ Each check is for a letter. The writer pricks holes through such perforations as will form the desired letter. The slip of tin is slid down the page as the work progresses. Braille writing is really a sort of stencil work consisting entirely of pin holes.

Education of the Blind. An Italian writer in 1646 first called attention to the possibility of educating the blind. But it was a long time before the sentiment awakened by this writer matured into practice. In 1784 Valentin Haüy established in Paris the first school for the blind youth. Mr. Haüy was also the inventor of books with raised letters which enabled his pupils to learn to read by the sense of touch. The success of this school was such that a school for the blind was opened in England. The early work of this school consisted chiefly in training in the manual arts. The movement spread rapidly over Europe and before the outbreak of the great war practically every country had institutions for educating the blind.

From the beginning the United States has recognized the education of the blind as the work of the state, and every state supports a school for the blind or provides for their education in an institution in an adjoining state. The first school for the blind in America was founded in Boston, Mass., and was incorporated by the Legislature in 1829 as the New England Asylum for the Blind. Work was begun in 1831 under the direction of Dr. Samuel Gridley Howe, who remained at the head of the institution for 45 years. Col. Thomas H. Perkins gave his mansion and the name

was changed to the Perkins Institution and Massachusetts Asylum for the Blind. From the beginning the success of the school was phenomenal. The other New England states promptly took measures to secure for their blind children the benefits of this instruction and sent their blind pupils to the Massachusetts institution.

The literary department included the common school branches, and mathematics, physics, astronomy and other secondary school subjects. A department of music gave the pupils the advantages of vocal and instrumental training. The foundation for an orchestra was laid—piano tuning was taught as a practical vocation and other trades such as broom and brick making were taught. Careful attention was given to the welfare of the pupils and they were led to consider themselves as a part of the great school-going public. Under Dr. Howe's administration the school attained the reputation of the leading school for the blind in the world, a reputation which it continues to hold.

All other schools in the United States have followed the plan developed in the Massachusetts school, and throughout the country the blind are taught to be self-supporting, self-respecting and useful.

Both raised letters and point systems are used in teaching the blind to read. The point system is usually preferred because the blind can write it. Typewriters with point instead of the regular alphabet are in use in schools for the blind. Geography is taught by relief maps, and libraries containing the best work of literature are found in all institutions for the blind, and in the Congressional Library at Washington a special reading room is set apart for their convenience.

Causes of Blindness. Some children are born blind, some become blind from diseases of the eye or otherwise, and blindness comes to some through accident. The diseases of the eye most likely to cause blindness are inflammation of the membrane that covers the lids and eyeballs known as *conjunctivitis;* granulated lids or *trachoma* and infection of the conjunctiva of newborn infants or *opthalmia neonatorum.* The disease usually appears on the second or third day after birth. Its symptoms are swollen eyelids and a discharge of pus. This disease causes one-third of the blindness in children. The eyes should be thoroughly cleansed with cotton and water, then two or three drops of two per cent solution of nitrate of silver should be dropped into them.

Bliss, Tasker Howard (1853-), an American army officer, was born at Lewisburg, Pa. He was graduated from the United States Military Academy in 1875, and from the United States Artillery School in 1884. From 1885 to 1888, he was professor of military science at the United States War College, and was for a time the military attache of the American legation at Madrid, Spain. He served in Porto Rico and Cuba, and later became collector of customs at Havana, and chief of the Cuban customs service. He was made brigadier-general in 1902 and made a member of the Army War College Board; later he was made commandant of the Army War College. Gen. Bliss held commands in the Philippines and on the Mexican border, and was made assistant chief of staff in 1915. In 1917 he was made a general, and in the same year accompanied the commission sent to Paris to attend the inter-allied war conference.

Blizzard, a severe snowstorm. A genuine blizzard is heralded by a mild thaw drawn suddenly to a close by a black, lowering sky, and is characterized by a furious wind, blinding fine snow, and extreme cold. The famous blizzard of January, 1888, extended from North Dakota to Texas. The thermometer fell suddenly in localities from 74° F. to —40° F. The total loss of human life is not known, but 235 deaths were recorded. Snow sifted through the walls of straw stables and packed in around the animals as they stood. Many cattle, tramping the snow beneath them, broke out through the flat straw roofs and fled before the storm. Some reached groves and other places of safety. Others were impaled on fences or fell into ravines, where they were found the next spring. The storm overwhelmed the cattle of the plains, involving the loss of millions of dollars. Branch railroad lines

were so buried in snow that trains were abandoned till spring released them from the drifts. Heavy snowstorms along the Atlantic coast not infrequently block traffic, break down telegraph wires, and cause much loss of life and property. The velocity of the wind is quite as high, but the eastern storm lacks the extreme cold and the dust-like penetration of fine, dry snow that characterizes the western blizzard. See SNOW; WEATHER BUREAU.

Announced by all the trumpets of the sky,
Arrives the snow, and, driving o'er the fields,
Seems nowhere to alight: the whited air
Hides hills and woods, the river and the heaven,
And veils the farmhouse at the garden's end.
The sled and traveler stopped, the courier's feet
Delayed, all friends shut out, the housemates sit
Around the radiant fireplace, inclosed
In a tumultuous privacy of storm.
—Emerson, *The Snowstorm.*

Blockade, a stoppage of legal commercial intercourse with the ports of an enemy. In time of war it is considered legitimate to prevent the ships of neutral nations from visiting the coasts and entering the ports of an enemy. International law requires that due notice shall be given. This warning may be conveyed to neutral governments by a general diplomatic notification, or warning may be given to individual ships. It is a breach of international law for a shipowner to attempt to pass in or out after a blockade has been established. If caught by the patrolling ships of the blockading power, the ship may be confiscated. The cargo goes with the ship, unless the owner can prove that he is not the owner of the ship, and that he did not know that his cargo was running the blockade, or intend that it should do so.

In order that a blockade may be recognized by neutral nations, it must be made effective. If we were at war with Mexico and were to notify the nations that the coast of Mexico was in a state of blockade, and yet patrol the coast with an inadequate force, say a single warship, this condition of affairs would be held to be what is known as a paper blockade. If our single ship happened to capture a merchant vessel carrying the British flag, for instance, the government of Great Britain might very properly insist that the ship be restored to its owner, on the ground that the blockade had not been made effective. To make a blockade effective it is necessary to patrol the coast in question and guard the harbors with enough ships to make it dangerous to attempt to go in or out.

During our Civil War our government notified all foreign countries that the ports of the South were in a state of blockade. Warships were sent to patrol the harbors. For a time blockade running to bring out the cotton much needed by English mills was a hazardous but profitable occupation. The headquarters of the blockade runners were in the Bahama Islands. Business rose from a few thousands a year to $23,000,000 during this period. After the blockade became more effective, English ships were shut out entirely, and cotton was burned to prevent its falling into the hands of federal troops.

The most striking blockade of modern times was declared during the wars between France and England at the beginning of the last century. Napoleon gave Prussia Hanover as the price of closing Prussian ports against English ships. Prussia had a perfect right to do so. England, by way of retaliation against Prussia and France, declared the coast from the mouth of the Elbe River to Brest under blockade. As a matter of course it was impossible for England to maintain this blockade; but nevertheless British vessels were able to cause coastwise commerce infinite annoyance. It was dangerous to enter a port or leave a port through that entire stretch of coast. In 1806 Napoleon issued his famous Berlin decree declaring the entire British coast in a state of blockade. He forbade the ships of all nations to enter British waters. England returned with the no less noted "orders in council," extending the blockade already declared, forbidding the ships of any nation to enter or leave continental ports from Italy to Prussia. These blockades were of little value to either England or France. They caused great distress. The owners of ships carrying neutral flags were obliged to tie up lest some French or English men-of-

war should confiscate them. Ships were afraid to sally out; trade languished; merchants were distressed; goods spoiled for want of transportation. These blockades came to an end, of course, even before the close of the Napoleonic wars.

During the Great War, the Allies blockaded the ports of the Central Powers so effectively that they drove the commerce of these powers from the sea. When Germany found that she was unable to break the blockade, she declared it illegal. Germany's blockade of British ports was only partially successful.

Blockhouse, a sort of fortification much used by the American settlers as a defense against the Indians. In its simplest form, it is a log house pierced with port holes for the use of riflemen. The typical colonial blockhouse was large enough to accommodate a force of from twenty-five to one hundred men. A basement was excavated in which women and children might remain secure from chance bullets. The walls were built of logs hewed and closely joined, sometimes of two thicknesses, so as to intercept bullets. A second story very frequently extended a few feet beyond the lower story, so that an enemy approaching the walls might be dislodged by an attack from above. Several blockhouses were frequently connected by a curtain or wall, in such a way as to inclose an area into which stock could be driven for protection. These walls were constructed of logs set upright in a trench so closely together that they formed a barrier against the arrows and bullets of the foe. A fort of this sort is more properly, however, called a stockade.

Block System, a method of preventing collisions on railways. According to this plan a line of railway is divided into sections guarded at each end by signal towers or semaphores operated by local officials in constant communication by telegraph. No train is allowed to enter a section until the display of a wooden arm on the signal tower indicates that the section is clear. In this manner no two trains are on the same section of track. If signals are displayed properly and obeyed, collisions are impossible. See RAILROAD.

Blondel, a celebrated French minstrel of the twelfth century. He was a favorite of Richard the Lion Hearted, and accompanied him to Palestine. On his return Richard was imprisoned by the emperor of Austria. Blondel set out to find his friend and master and wandered, it is said, from castle to castle seeking him. Learning that some illustrious captive was confined in the tower of a certain Austrian castle, he stationed himself at a distance and began to sing a song that he and Richard had sung together in former days. No sooner had Blondel sung the first stanza than a well known voice took up the song and finished it. Having thus located his master, Blondel repaired to England with all speed, and set on foot measures for Richard's release. The story may not be true, but it is a delightful account of friendship. It has given rise to the expression, "the faithful Blondel." See RICHARD I; THE TALISMAN.

Blondin, Charles (1824-1897), a distinguished French acrobat. He won a reputation as a rope walker in his native France. His most distinguished performances, however, took place during a tour of the United States. June 30, 1859, he crossed the Falls of Niagara on a tight rope. This he did in the presence of a crowd of 25,000 people. On the fourth of the following July he crossed again, blindfolded, trundling a wheelbarrow in front of him, and on the nineteenth of August, he crossed a third time carrying a man on his back. The next year he crossed for the fourth time walking on stilts. It seems incredible that any performer should walk on a slender rope for a distance of several hundred feet, much less keep his balance when crossing a chasm over 300 feet in depth. It would seem that the moving waters below would cause him to lose his head. The slightest tremor or misstep would have sent him to his death. His performances took place, however, in the presence of thousands, including the Prince of Wales, and cannot be disputed. See NIAGARA.

Blood, the red liquid of the body. From one-tenth to one-thirteenth of a healthy person's body consists of blood. The

blood of a horse equals one-eighteenth of the body-weight; that of an ox is about one twenty-third.

Blood is about eight-tenths water. This water keeps the organs of the body moist and flexible, but its chief office is to carry nutrients to the tissues and waste away from them. Although not the first to understand the circulation of the blood, Dr. Harvey of London was the first to announce distinctly that the blood is forced by the contraction of the heart through tubes or arteries to all parts, including the utmost extremities of the body, and that it is collected again by tiny drainage tubes which unite into larger and larger veins until they pour the blood back into the heart again. To complete its circuit, the blood is forced by a similar system of outgoing arteries and incoming veins through the lungs. It is then ready for another trip through the body. A round trip occupies from fifteen to thirty seconds. The blood of a horse circulates in thirty-one seconds.

As stated, the water of the blood is a carrier. The lungs and the digestive system pour gases, oxygen, hydrogen, nitrogen. sugars, salts and fats, lime, iron, and all kinds of food into the blood, which whirls the molecules along in its current and deposits them where they are needed to build up bone, muscle, sinew, and fat. Material no longer needed by the body is dumped into the veins and drained away, to be taken care of and expelled through the lungs, the kidneys, the skin, or the alimentary canal. Of course, the blood carries whatever is poured into it. If one's food is unwholesome, the blood carries poor building material. If the water one drinks, the air one breathes, or the food one eats contains germs, the microbes of disease, the blood carries them promptly to the tissues. Malaria, for instance, is nothing more or less than the presence of countless numbers of microscopic animals introduced into one's blood in the first instance by the bill of a certain mosquito.

Although the blood cannot refuse to carry germs of disease, nature has made a wonderful provision to render them harmless. The blood is full, literally swarming, with white, spherical corpuscles or cells that feed on bacteria. If one is in health and well nourished the chances are that these white cells will take care of all harmful animals and bacteria. In famine-stricken districts where the people have thin blood, lacking in vigorous white cells, contagious disease is most likely to get a footing and become an epidemic.

The color of the blood is due to still more numerous red cells or corpuscles, in the proportion of ninety-nine red cells to one white cell. They are so numerous as to be beyond comprehension—5,000,000 to a cubic millimeter. They are flat disks pressed inward on each face. They run through the fine capillaries, face to face, like a roll of coin. In most animals the red cells are circular, but in the camel and in reptiles they are oval. The red cells of the various animals differ greatly in size. Those of a frog are very large. Those of a sheep are small. Human corpuscles may be identified, therefore, under a microscope. More than one blood-stained knife and many a blood-stained garment has been examined to ascertain whether the telltale spots were caused by human blood. It is literally true that blood cries out against a murderer.

Millions of red corpuscles break down in the body during every second of time. New ones are supplied by the red marrow of the bones, where they are produced and sent into the circulation. The number of red corpuscles varies with conditions. They increase in high latitudes. They often decrease during disease of the body, producing a condition called anaemia.

The red corpuscles are the carriers of oxygen. Arterial blood, or blood going outward, has a bright red color, due to oxygen freshly obtained from the lungs. Venous blood, or blood returning through the veins, is dark, not only lacking oxygen, but laden with waste matter. The blood of animals is warm or cold according to the amount of oxygen it carries. Cold-blooded animals do not require to breathe so freely as the warm-blooded animals.

The proper temperature of the human body is about 98° F. The circulation of the blood equalizes the temperature of the body. Cold-blooded animals have the temperature of their surroundings. The blood does not supply enough oxygen to keep them warm. Warm-blooded animals are supplied with oxygen from the blood. Their bodies possess a temperature in a degree, at least, independent of their surroundings. The power of the blood to keep up the temperature of the body is indispensable to animal life in cold countries. The Eskimo, and, in fact, all people living in wintry climes would be frozen solid, were it not that the blood carries oxygen to all parts of the body and keeps the temperature very nearly constant at 98°.

Blood possesses a peculiar quality of clotting on exposure to air. Blood is composed of clear liquid and of blood cells or corpuscles. The liquid is called plasma. If plasma is exposed to the air, threads known as fibrin are formed. These fibrin threads entangle and inclose the corpuscles, forming what is known as a clot. This quality of clotting or coagulating closes wounds, if not too serious, and prevents bleeding. Physiologists are satisfied that clotting is not due to the fact that blood has ceased to be in motion, nor is it due to exposure to the air. They do not know why blood clots, neither do they know why it does not clot while it is within a healthy blood vessel.

See MALARIA.

Blood Avenger. In primitive society the person charged with the duty of avenging the crime of murder, usually the next of kin. This duty and its regulation by law were the beginnings of our system of criminal law. The crimes with which primitive law concerns itself are those of violence, namely, murder, wounding and robbery. The punishment was not left to the state, but to the injured person, or his next of kin. This legalized right was called blood feud, which, in course of time became mitigated by the doctrine of sanctuary, which held vengeance in abeyance until time had cooled the passions and the justification of the act could be made apparent.

The law of Moses recognized this institution of primitive society, but put it under regulations, prohibiting the commutation of the penalty, and appointing "cities of refuge" for the slayer who was not really a murderer. The avenging of blood by the next of kin is sanctioned by the Koran, but also makes provision for the expiation of the crime by a money payment. The primitive custom is in force among the Arabs to this day.

Bloodhound. See DOG.

Blood Money. The compensation paid in early law to the next of kin of the slain man, securing the murderer or offender and his relatives against subsequent retaliation. This custom was in use in the northern countries of Europe until after the introduction of Christianity. The amount to be paid was fixed by law, as well as to whom it was to go. It was not limited to cases of manslaughter alone, but was extended to all crimes of violence. Slaying a person when asleep or in church was considered a "bootless" crime, or one for which no money compensation could be made. Such a crime was a breach of the king's peace and the offender was outlawed and abandoned to his enemies. In these cases, even, in one of the barbaric codes of the Middle Ages, the guilty person "may redeem himself from the wilderness with 40 marks when the injured party has interceded for him."

Blood Poisoning, a disease caused by the presence in the blood of bacteria, or germs, which become lodged in various parts of the body, setting up local points of infection. In medical works blood poisoning is usually known as septicaemia. Abscesses may form, and suppuration of the intestines may follow. Typhoid fever or appendicitis may occur as secondary complications. Blood poisoning may ensue from such slight injuries as a scratch or bruise, which if not immediately treated with antiseptics may result in infection.

Blood poisoning is marked by chills, sweating and high fever; the tongue is coated, brown and furred, and sometimes there is rapid emaciation, in fact, the whole system seems to sympathize. The disease may run its course in a comparatively sho

period, and again may last for months, sometimes terminating fatally.

Treatment consists in eliminating the original point of infection, opening new abscesses, and draining any cavities of fluids. Stimulants, together with tonics, such as iron and quinine, are valuable adjuncts in the treatment of this disease. But, as stated above, immediate measures of prevention are the best safeguards. When any injuries of the nature mentioned occur, it is wise to use an antiseptic at once. Iodine is one of the best and safest remedies, and it should be freely applied. Formerly there was great danger in operations owing to ineffective sterilization, but modern surgical methods have to a great extent eliminated this danger.

Bloodroot, a noticeable woodland flower of early spring. The white petals fall off soon after they come out. A large kidney-shaped leaf springs up beside each flower stalk. The leaves, flower stalks, and root-stocks are charged with a yellowish red juice that oozes out wherever they are broken. The blossom makes a handsome starry appearance above the dead leaves. In spite of its disagreeable juice it is endeared to children. "Bloodroots are out," is always hailed as an announcement of the happy flower season and of rambles in the woods. The bloodroot is a member of the poppy family. It is found only in the eastern United States and Canada. The plant has valuable medicinal qualities allied to those of opium.

Bloomfield-Zeisler, Fannie (1866-), a well known and very popular pianist, was born in Bielitz, Austria. When a young child she came to the United States with her parents, who settled in Chicago. Her musical ability showed itself early and she received a thorough training in harmony, composition and the technique of the piano. She finished her studies in Vienna, where she remained for 5 years, a pupil of Theodore Leschetizky. In 1885 she married Sigmund Zeisler, a Chicago attorney. Mrs. Bloomfield-Zeisler has played in the leading cities of the United States and Europe, and has everywhere been acclaimed as one of the great artists of our day.

Bloomington, a city of Illinois, one hundred twenty-six miles from Chicago. It is the county seat of McLean County, and is on the Illinois Central, the Chicago & Alton, and other railroads. Bloomington is a busy and prosperous city. There are manufactories of stoves, farm implements, and machinery; there are railroad shops, brickyards, furnaces, and flour mills, while coal-mining, fruit-canning and pork packing are among the industries. The city owns its system of waterworks and its electric light plant. It has a public library and a handsome city hall. The Illinois Wesleyan University is here and at Normal, two miles distant, is a State Normal School and the State Soldiers' Home. A high school was erected some time ago at a cost of $400,000. Besides these, there are many other educational facilities, such as business colleges, schools for music, and other institutions. Population, 1920, 28,725.

Bloomington, Monroe County, Indiana, the seat of the Indiana State University, is situated about sixty miles from Indianapolis, on the Illinois Central, and the Chicago, Indianapolis & Louisville railroads. Its area is over two square miles. It is located in a large limestone quarry district, which gives employment to many people. Other flourishing industries are the making of furniture, hardware and leather products.

In addition to the university, which has a library of 5,000 volumes, there are several high schools, and a Carnegie library. The most important buildings are those of the university, the post office, and a Methodist church, built in 1913 at a cost of $150,000. The Indiana University Park, which comprises ten acres, is the largest park in the town. Bloomington, also called the "University City," has a population of 11,595.

Blowgun, a primitive weapon used especially by some Indian tribes of South America. It consists of a tube or blowpipe from ten to twelve feet long, ingeniously constructed by setting one palm stem within another so as to prevent warping. An arrow about two feet in length is made from the spine of another palm. It is wound with cotton down to make

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